

Railway Age

FIRST HALF OF 1919—No. 22

NEW YORK—MAY 30, 1919—CHICAGO

SIXTY-FOURTH YEAR

Published weekly by Simmons-Boardman Pub. Co., Woolworth Bldg., New York, N. Y. Subscription Price, U. S. and Mexico, \$5.00 a year; Canada, \$6.00; foreign countries (excepting daily editions), \$8.00. Entered as second-class matter, January 30, 1918, at the post office at New York, N. Y., under the act of March 3, 1879.

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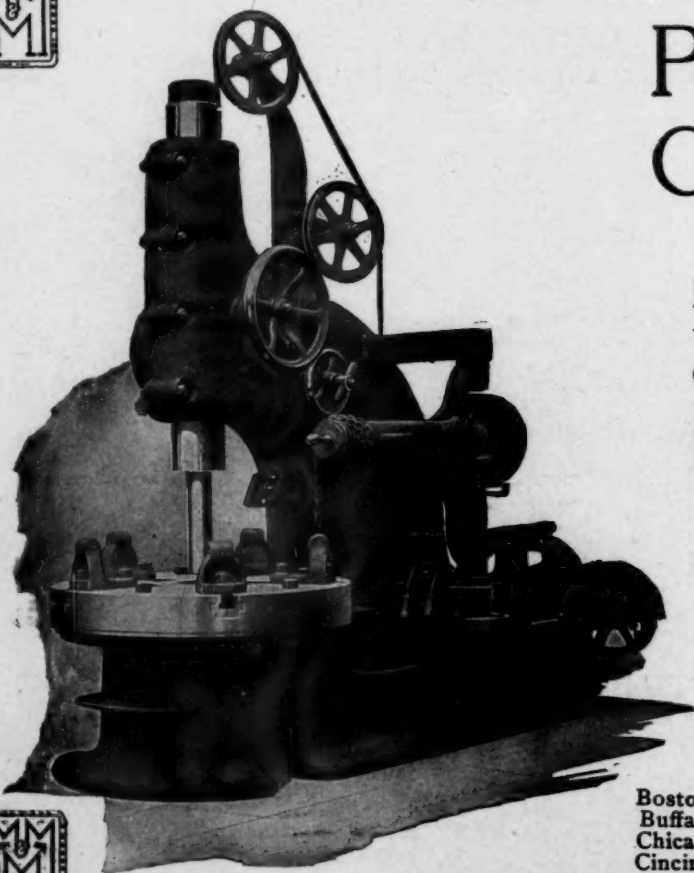
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EDITORIAL

Railway Age

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A mistake in compiling statistics caused the *Railway Age* to make a misleading comparison in the editorial in its issue

Correction of a Statistical Error

of May 9, entitled "The Railroads—a Bankrupt Industry," between the traffic handled in the first three months of 1916 and the first three months of 1919. It was stated in the editorial in question that in the first three months of 1919 the freight traffic of the railways was 85,000,000,000 ton-miles, while in the first three months of 1916 it was only 80,000,000,000 ton-miles, an increase in 1919 over 1916 of over 6 per cent. A recheck of the statistics shows that the total mileage in the first three months of 1916 was almost 90,000,000,000. With this correction, the statistics show that the ton mileage in the first three months of 1919 was 5 per cent less than in the first three months of 1916, while the total earnings of the railways were 38 per cent greater and the operating expenses 85 per cent greater.

The Pennsylvania's twenty-hour train from New York to Chicago, which was voluntarily discontinued before the roads

Broadway Limited and 20th Century

had been taken over by the government, has now been restored. During this period of discontinuance, the two new west side subways in New York have been opened. This means that it is now more convenient to get from west side uptown New York City to the Pennsylvania Station than it is to Grand Central Terminal. It is now equally convenient to get from the downtown district to the Pennsylvania Station and to Grand Central; it is more convenient to get from a large part of Brooklyn to the Pennsylvania than to the Grand Central. Heretofore, the New Yorker leaving his home in almost any part of Manhattan or Brooklyn or leaving from his office could get more easily and quickly to the Grand Central Terminal than to the Pennsylvania Station. In the same way, travelers from Chicago have found the Grand Central the more convenient station at which to arrive in New York. All this has given the Twentieth Century a considerable advantage over the Pennsylvania's twenty-hour train. It would seem now that the situation is partly reversed. Will this in time enable the Pennsylvania to carry as many or more passengers on its fast New York-Chicago train as does the New York Central or will tradition of the Twentieth Century enable it to hold its own large business despite changed conditions in New York? In Chicago the situation still favors the Twentieth Century, the La Salle Station, which is used by the New York Central, being more accessible than the Union Station, which is used by the Pennsylvania.

Every concern or person that does business with the Post Office department nowadays has its or his grievance, while all persons and concerns that do business with it share in certain general grievances. All have a grievance because the service has so greatly deteriorated under the regime of Postmaster General Burleson. The postal employees have a grievance because of Mr. Burleson's autocratic methods. The railways have a grievance because the postal department,

The Zone Postal Rate System

with the assistance of Congress, has so fixed their compensation for carrying the mails as to cause them to carry it at a loss. Publishers have a grievance because Congress, at the instance of the postal department, has established a zone system of charges for carrying newspapers and magazines. The readers of many newspapers and magazines will soon have a grievance because the zone postal rates are forcing many publishers to adopt zone subscription rates. We have just received an announcement that Collier's Weekly will continue to cost five cents a copy east of the Mississippi River but will be advanced to ten cents a copy west of the Mississippi River. Heretofore newspapers and magazines of all kinds have made the same subscription rates to all points within the United States and higher rates to foreign countries. As a result of the zone postal rate system the territory west of the Mississippi River has, so far as Collier's is concerned, been legislated out of the United States. The *Railway Age* and other papers published by the Simmons-Boardman Publishing Company have not yet adopted zone subscription rates, but if the existing zone postal law remains in effect it will become necessary to do so. Most publications with national circulations will be forced to discontinue charging flat subscription rates and to charge higher rates to subscribers living in parts of the country remote from the offices of publication.

At the "ordinary general meeting" of the Grand Trunk, held in London recently, the chairman, Alfred W. Smithers, men-

The Grand Trunk Difficulties

tioned the fact that a third offer had been made by the Grand Trunk to the Canadian government for terms under which the government could acquire the Grand Trunk and the Grand Trunk Pacific on the basis of an annual sum to be paid by the government, to be distributed by the directors. In January, 1918, the dominion government of Canada asked the directors of the Grand Trunk to name their terms. An offer was made by the company, was rejected by the government, which then made a counter offer; this counter offer was rejected and, after long negotiations a second offer was made by the company to the government but this also was refused. The situation as it is at present is absolutely unsatisfactory to everybody concerned. The government obtained the appointment of a so-called "receiver" for the Grand Trunk Pacific but this does not relieve either the Grand Trunk or the government from its guarantees of Grand Trunk Pacific securities. Worse than this, however, in a way, is the situation of the Grand Trunk, itself. Its subsidiary lines in the United States are being operated by the United States Railroad Administration and it is receiving, therefore, rental for these lines. The Grand Trunk in Canada, however, is being operated without government aid or guarantees. As Mr. Smithers points out, the railways of both the United States and of Great Britain are being operated under government guarantees but were it not for these guarantees, most of them would be in financial difficulties. The Canadian Pacific has been able to preserve its credit and to continue paying its dividends because it is financially the strongest great railroad company in the world and because it has, besides its railroad, many other profitable activities, including the operation of ocean steamship lines. The Grand

Trunk, on the other hand, has a financial structure comparable to that of most of the moderately strong roads in the United States. What has happened and is happening to the Grand Trunk is a good example of what would happen to many railroad companies in the United States were the government guarantees to be withdrawn without some readjustment in the relations between expenses and income.

While the general results of government operation of railways have not been satisfactory, some improved methods

The Permit System of Handling Grain

have been introduced which by all means should be retained. One of these is the permit system of handling grain. It was used with highly beneficial results last year, and Director General Hines has announced it will be used again this year. While it takes some machinery to operate it, the purpose and effect of the system are simply to prevent grain from being shipped from the farms in larger volume than it is possible for the railways satisfactorily to handle it. When the grain pours in to the central markets and the ports faster than it can be unloaded congestion at railroad terminals develops. Congestion renders it impossible for the railways to handle as much grain and other traffic as they could in the absence of congestion. Under the permit system the shipper is required to get a permit before he ships his grain and permission to ship is given only as fast as the railways can handle the grain and it can be unloaded at the terminals and ports. The use of the permit system is especially necessary when, as at present, the price of wheat is fixed by the government, and no farmer has any incentive to hold it after it is harvested. The use of the permit system would be beneficial to the farmers, the railways and the general public, however, even in years when the price of wheat was not fixed. In the framing of legislation for the regulation of the railways after they are returned to private operation power ought to be given to the Interstate Commerce Commission, or some other governmental body, to authorize, or even require, the railways, under the regulating body's supervision, to use the permit system in times of heavy traffic movement. Benefits might be derived at such times from extending the use of the permit system to commodities besides grain.

Outcome of the Steel Price Controversy

THE OUTCOME of the controversy over the prices of steel rails was not unexpected. The director general of railroads refused to accept prices fixed by the Industrial Board and advertised for bids. All the steel companies which responded, except one, bid the prices which had been indorsed by the Industrial Board. The one company which did not bid them asked for higher prices. The director general, under protest, has placed orders for 200,000 tons of rail with six companies at the lower prices bid. Director General Hines unquestionably has sincerely believed that the prices asked have been too high, and has made a vigorous effort to effect a railroad economy by getting them reduced.

On the other hand, there is no reason to doubt that the officers of the steel companies and the members of the Industrial Board were just as sincere in the belief that the prices offered were fair; and the steel companies could not reasonably have been expected to offer lower prices than those the Industrial Board had approved. So far as the public is concerned, it has not been given information sufficient to enable it to form an intelligent opinion as to the merits of the controversy. The tendency of business men generally

has been to side with the steel companies, largely, no doubt, because of the general distaste of most business men for government operation of railways. Future developments regarding rail prices will be watched with interest. About 1,600,000 tons of rail are required annually for the normal maintenance of the railways under government control. Therefore, the orders which the director general has placed will provide for only about one-eighth of their annual requirements. In order to secure the greatest practicable economy in steel production and provide for the normal maintenance of the railways and for taking up deferred maintenance, other and much larger orders ought to be placed soon.

Looking at the matter from the standpoint of national welfare, it would seem that they ought to be placed on a basis of price which will tend to enable the entire iron and steel industry to prosper, just as railway rates ought to be so fixed as to yield a reasonable average return to all the railways. If railway rates were so fixed that only the roads which can handle traffic the cheapest could prosper the railroad industry of the country as a whole would soon be on the rocks; and the same principle which should cause railway rates to be so fixed as to be fair to both the "high cost" and the "low cost" railways should cause steel prices to be so fixed as to be fair to both the "high cost" and the "low cost" steel mills.

Mr. Brisbane Is Disappointed

ARTHUR BRISBANE, who receives a larger salary for writing in a plausible and emphatic style what Hearst would like to have the people believe than he could probably earn by writing what he knows to be the truth, rejoiced greatly when the government took over the railroads, because it represented at least one step toward following his advice that the government take the railroads for keeps. He expressed considerable worry for a time lest the government spend "millions of the people's money" to put the roads in "gilt-edge condition," as he called it, and then return them to their owners, but he found much to praise until the experiment had progressed sufficiently to demonstrate that Mr. McAdoo was not fulfilling all of his rosy predictions of what the government could accomplish that private management could not.

Now that the President has announced that the roads will be returned at the end of the year Mr. Brisbane finds that "nothing more outrageous is in the history of using public money for private benefit than the management of American railroads." This is based on his statement that the \$1,200,000,000 appropriation asked by the Railroad Administration is "to meet the deficit, which means to patch up and rebuild the run-down properties," and that "the government admits that hundreds of millions spent on the roads will not be repaid to the taxpayers." Of course, Mr. Brisbane knows, even if many of his readers do not, the difference between upkeep and capital expenditures, and he knows that the \$486,000,000 deficit, the part of the appropriation which Director General Hines admits will not be repaid, was incurred in following Mr. Brisbane's own advice to raise wages. He also knows that whatever patching up and rebuilding of the railroad properties is being done is also being charged up to the companies, and that the \$775,000,000 which Mr. Hines says has been or will be advanced to the railroad companies for capital improvements represents the part of the appropriation which will be paid back to the government because the latter has good security for it. If the government should so regulate the railroads as to make it impossible for them to pay back the sum thus charged against them and the government has to foreclose on its lien, then Mr.

Brisbane will be given an opportunity to boast that Mr. Hearst brought about government ownership which he is not likely to be given except in that way.

Mr. Brisbane also objects because Mr. Hines has found it necessary to buy the comparatively small quantity of 200,000 tons of rail. He asks why the Railroad Administration, after having lived nearly a year and a half on the rail ordered before 1918, does not postpone this order and make the railroad companies buy the rail after they get their roads back. It would not, of course, be a part of the Hearst policy to tell the people that even government operation produces a certain amount of wear on the rail which it is necessary for safe operation to replace as a part of current upkeep expense.

Expedite the Railroad Appropriation

THERE IS NOTHING Congress can do which will produce a better effect upon general business than to pass promptly a bill providing the \$1,200,000,000 fund for the Railroad Administration, for which Director General Hines has asked. A bill to appropriate \$750,000,000 was introduced at the last session of Congress, but was defeated by a filibuster. The Railroad Administration was nearly out of money at that time. This was due to the deficit which it had incurred, to expenditures which it had made for additions and betterments and equipment and to advances and loans to the railway companies. Because of the failure to make an appropriation for it at the last session, it has had to borrow money from the War Finance Committee, to issue certificates of indebtedness for large sums, to leave large amounts of its debts unpaid, and to curtail sharply its expenditures for maintenance and improvements.

The skill and courage Director General Hines has shown in dealing with the conditions the want of funds presented to him have been admirable; but Congress ought not to allow the existing situation to last any longer than is unavoidable. The inability of the Railroad Administration to carry on needed maintenance and improvement work is having a very depressing effect upon industry. Its issuance of certificates of indebtedness to meet some of its debts and its failure to meet large amounts of them at all, have helped to increase the inflation of credits, which is becoming a menace to the country's welfare. The railway and railway supply companies to which it owes money have been obliged to borrow heavily from banks when they should have had the money the Railroad Administration owes them to carry on their businesses. Justice to those to whom the Railroad Administration, as an agency of the government, is indebted and the welfare of the country require that it shall be enabled as soon as practicable to pay its bills.

The letter Director General Hines wrote to Secretary of the Treasury Glass on May 24 discloses that of the \$1,200,000,000 for which he asks, \$486,184,940 is needed because of deficits which the government has incurred in its operation of the railroads. Of this, \$236,184,940, it is shown, is the amount of the deficit incurred in the year 1918. This figure is \$10,000,000 larger than the last official estimate of the deficit for 1918, and apparently is arrived at by adding to the expenses of the individual railways under government control the expenses incurred by the overhead organization of the Railroad Administration. The estimate of the deficit for the first four months of 1919 is \$250,000,000. The original revolving fund provided for the Railroad Administration amounted to \$500,000,000. It will be seen, therefore, that the deficit for 1918 and the first four months of 1919 practically consumed all of this.

Of the \$1,200,000,000 additional for which Mr. Hines

now asks, about three-quarters of a billion dollars represents amounts advanced or to be advanced for the account of the railroad corporations and \$425,000,000 is temporarily tied up in working capital. If no more deficits should be incurred under government operation, this entire \$1,200,000,000 would ultimately be returned to the government. But it appears probable that large deficits will continue to be incurred during the rest of the year unless rates are advanced.

The Railroad Administration should be enabled, not only to pay its outstanding debts, but to increase its expenditures for maintenance in order to bring the railways up to the physical condition they were in when it took them over, and it should also be spending more money for improvements. These things are needed, not only to put the railways in good shape, but for the welfare of the country during the period of transition from a war to a peace basis. The railroad appropriation bill introduced in the last Congress should not have been defeated. The one introduced in this Congress should be passed immediately.

The Case of the Engineer

TWO LETTERS to the editor appearing in this issue discuss the editorial published in the issue of May 2 concerning probable effects of wage standardization in railway engineering positions. Regardless of the merits of the recent campaign to increase the pay of technical men, the history of all collective bargaining goes to show that the success of employees in wresting standard wage concessions from their employers is almost always followed by a leveling of compensation rates, for two reasons: The employer usually will not pay more than the established minimum, and the organizations of employees usually strive to reduce the distinction between the efficient, intelligent workman and the drone.

However, the problem that confronts engineers today is not one of theories but of facts. Though organized efforts for material gain may have some unfortunate consequences such as the ones alluded to above, it is futile to dodge the fact that educated salaried men are confronted by an economic menace. "Something must be done," are the words on every engineer's lips. The situation is not one of a day's making. Engineers on railways, especially in the lower ranks, have been hampered by inadequate salaries for a period reaching back ten years or more. How long and clearly this situation has been recognized is shown by the discussion of the subject appearing in the *Railway Age Gazette* of March 16, 1917, page 437, in which a number of engineering educators expressed the attitude of the technical graduates toward railway positions.

But the subject is broader than railway employment. It is broader than the engineering profession. It touches the entire class of brain workers. For, while this important and ambitious stratum of society has given immediate compensation secondary consideration in its desire to secure the necessary training and experience for future advancement, labor, organized in many of its branches, has wrested concessions from capital in the form of increased wages and shorter hours. As a consequence the unorganized salaried worker finds himself doubly embarrassed. His income has not been advanced in proportion to that of the laborer, while the cost of living has greatly increased, largely owing to the fact that the productive efficiency of labor has not increased in proportion to the advances in its wages.

The overwhelming success of union labor, directly or indirectly resulting from the war, in getting higher wages, together with the contemporaneous upheaval in money values have served but to aggravate the condition, and the brain worker has come to feel that he is being ground between the

upper and nether millstones of capital and labor. No wonder that his mind turns to thoughts of organization.

If engineers must organize to promote their material interests, what form shall their organization take—or to put it on a more practical basis, what organization shall they join? For, as stated in our previous editorial, there are two well defined schools of thought on this subject, represented by those who believe that the "Founder Societies" of engineers should represent the engineer in his economic struggle and those who favor a strictly business organization like the American Association of Engineers. It is not within our province to answer this question. The individual must decide that for himself. However, it does not seem out of place to point to some of the considerations to be taken into account in making this decision.

The older associations and their common body, Engineering Council, have the advantage of numbers, resources, weight. They include a personnel which embraces the widest, most renowned and most respected of the professions. With all these advantages theirs is the opportunity of the time, if they have the foresight to seize it. Their disadvantages are mainly those arising from the inertia of large and old institutions given to using established methods and to following time-tried lines of thought. The fact that they represent the older and more thoroughly established members of the profession will insure that no false steps are taken. However, it may also tend to make the steps taken slow and few in number. A still further consideration is the doubt in the minds of the younger men as to whether their older brethren who have "arrived" are willing to recognize the young man's plight in full and sympathetic measure.

The American Association of Engineers represents itself as a business organization having the single purpose of furthering the material interests of the profession as a whole and of its members individually. It denies emphatically that it is a labor union or that its policies are to be remotely associated with those of organized labor. This view is borne out by the fact that its membership includes men in the highest as well as the lowest ranks of the profession, that not a few railway officers are included within its numbers and, furthermore, by the formation recently of several draftsmen's and engineers' unions affiliated with the American Federation of Labor and composed of men who, presumably, were not attracted by the outlook and policies of the American Association. In opposition to this view it must be recognized that this association includes among its members the more radical men of the profession, these being perhaps not so much its younger members as older men who have not been very successful. Moreover, there has been more than one attempt to stampede the organization into the American Federation of Labor, and into the adoption of union labor policies and methods.

While the prospects of the success of such attempts may be small, it is but fair to call attention to them, since it would be most unfortunate if commonly adopted by labor organizations should be introduced into the engineering profession. Seniority, limitation of output and the strike should have no place in engineering. Doubtless many members of the American Association of Engineers would make so earnest a fight against the adoption of these objectionable methods of labor unions that there is little prospect of their being adopted, in the near future at least. The tendency, however, is there and it must be carefully watched.

The older associations are also on trial. Their future is contingent largely on their retaining the interest and sympathy of the young men. The outcome will depend upon the extent to which these established institutions can turn their united and enthusiastic efforts to solving the problems of the present. It is true that they have undertaken the task but they must register progress in no uncertain terms.

Letters to the Editor

Conductors and Bull Dogs

CINCINNATI, Ohio.

TO THE EDITOR:

The article on Harmony and Safety published in the *Railway Age* of May 2, page 1104, sets forth a much needed lesson. I have been identified with railroads in the capacity of brakeman, freight and passenger conductor, train master and superintendent since the good old days of the link and pin and the hand brake, and have met with all dispositions from the mild angelic to the continual grouch, and have administered treatment from mild to heroic. Mild discipline will effect a permanent cure if properly administered. About three years ago I received a wire from Conductor Smith advising me that he would not take rear brakeman Jones out another trip. At about the same time I received one from Jones advising me that he would not go out with Smith another trip. I called them to the office and inquired as to the nature of their trouble. Smith said Jones would not answer when given instructions, and so on. Jones said Smith would not talk to him or show him their train orders. Both confirmed their messages, refusing to go out another trip on the same train. I then asked them if they knew why the bulldog and the striped hyena are the most vicious of fighters. Both replied that they did not. "Because they are the most ignorant," said I. "Both get a neck hold and won't let go." Smith and Jones smiled and said they did not want to be looked upon by their fellow employees and superior officers as human bulldogs and hyenas. "Then shake hands," said I, "and promise to be gentlemen in the future; be brothers in fact as well as in name." This mild treatment effected a permanent cure. It was harmony in the concrete.

J. S. M.

Effects of Punitive Overtime

ST. LOUIS, Mo.

TO THE EDITOR:

Your editorial in the *Railway Age* of May 2 on the results that would obtain if train and enginemen were granted "punitive overtime" fails in my opinion to mention the most important thing that would result.

Every one knows that train and enginemen are just like any other class of workmen, some being very efficient, some passably so, others very inefficient, and a few disloyal to their employers. Some of them figure only on getting by as easily as possible and securing the most money possible, and in no other occupation that I know of can men hold on as easily as in the train and engine service, for the reason that it is very hard to give it close supervision. So many things can happen on a train that can be used as an excuse for delays that it is hard to locate the employees who are inefficient or disloyal; and to discharge a man for inefficiency or disloyalty good proof must be available.

On account of the things mentioned, I think the granting of punitive overtime to these men would be the most disastrous thing that was ever done.

All railroads have many men who take pride in taking a tonnage train over a 100-mile division in from five to eight hours, and do it almost every day. There are others who cannot do this; not because they do not wish to, but because it is not in them. There are still others who will not do it if it suits them better to make a little extra money by making a little overtime.

The result will be that the efficient and loyal crew will draw straight time, while the inefficient and disloyal crew will draw from 30 per cent to 60 per cent more for overtime, thereby putting a premium on inefficiency and disloyalty. This in my opinion will, sooner or later, ruin the efficient and loyal man in train and engine service.

There should be some way provided whereby loyalty and efficiency will be rewarded, instead of disloyalty and inefficiency.

GENERAL MANAGER.

Engineering, a Profession or a Trade

PITTSBURGH, PA.

TO THE EDITOR:

The editorial in the *Railway Age* of May 2, 1919, entitled "Shall Engineering Be a Profession or a Trade," contained certain statements which the writer believes will be misleading to those of your readers who are not familiar with the recent activities of the American Association of Engineers, and he begs leave, therefore, to submit the following observations:

A profession or a trade is such when it is considered to be so by society. Any group of men who have a common specialized knowledge may claim its vocation to be a profession; but only when its specialized knowledge has been raised high above the attainments of most vocations, and when its fitness to carry out a particular, difficult, necessary work has been proven, will men generally concede its right to be dignified by the title of profession. The right of engineers to the use of this word is a comparatively recent acquisition. It was not until the requirements of engineering work compelled the development of a high order of engineer, and until the engineer had raised his capacity for service to society above the abilities of the trades, that engineers were so rewarded.

The assertion that this attainment may be lost by standardization of wages and positions, such as is proposed, and by collective bargaining, seems unfounded. So long as engineers expand their activities and develop their abilities to meet the ever increasing demands of society, just so long will they retain their standing as professional men; and whatever steps they may take toward improving their social welfare will not have a tendency to reduce the professional standard, providing there is no violation of the trust reposed in the profession by society.

Men everywhere concede the right of everyone to receive a compensation commensurate with his services; and since the compensation of engineers is obviously inferior to that received by other workers, the writer does not believe that any fair methods which may be used to bring it to a proper level will result in censure of the profession or loss of professional standing. Collective bargaining is not inconsistent with professional principles, provided one of the parties does not use unfairly any advantage he may possess. Surely a bargain consummated after a fair bidding between the contracting parties is less open to criticism than price-fixing by a group maintaining a monopoly; and yet the price-fixing method is the one used by the legal and medical professions. It is pertinent to remark, perhaps, that such price-fixing is scarcely different from the essential rules of action of trades-unions, but has met with little opposition, because the clients of the lawyers and physicians have not been organized to resist its application as the employers of labor have been able to resist the prices proposed by the trades.

Standardization of positions and working conditions may result in stifling individual ability and initiative if carried to the point where methods, operations, and processes are standardized. Nothing of this sort has been proposed, however, nor will it be; the only standardization proposed is of the

titles used in railroad service, in order that a wage increase may be applied fairly.

Standard wages already exist in individual railroad organizations without causing a loss in professional standing; although at present the maximum wage for certain positions is standard, while the proposed schedule calls for a minimum wage. Knowing this to be true, the writer cannot see that if the Railroad Administration adopts the schedule proposed by the American Association of Engineers it will have the results you submit.

Railroad engineers do not propose to use trades-union tactics. This was evidenced by the sympathetic enthusiasm shown at the railroad engineers' conference in Chicago on March 17 at the reply of W. W. K. Sparrow, corporate chief engineer of the Chicago, Milwaukee & St. Paul, to the question as to what he would do should the railroads refuse to consider the schedule of wages proposed, when he said, "I would not strike." Those who witnessed that incident came away with the feeling that what was to be done could be accomplished, and would be, by no sacrifice of professional ethics.

You are right in saying that "present conditions call for sober thinking on the part of all engineers in railway service." It requires little thought, however, to decide to avoid trades-union methods—professional instinct will prevent that; but the question to be given serious thought is this: Is the pride in one's profession, and the pleasure of doing railroad work, worth the difference between the compensation offered to railroad engineers and that enjoyed by men of similar qualifications in other work? The writer can assure you that very many railroad engineers have already decided this question in the negative.

CEDRIC B. SMITH.

The American Association of Engineers

CHICAGO.

TO THE EDITOR:

In an editorial appearing in your issue of May 2 you ask the question "Shall Engineering Be a Profession or a Trade?" You clearly indicate in your reply that it is your opinion the American Association of Engineers would make it a trade, while the older technical societies represented by Engineering Council would not. You say the American Association is patterned in many ways after the trade unions. Before deciding to join the American Association I studied this very carefully as I am strongly—I might say violently—opposed to the introduction of trade union methods into an engineering organization. I was thoroughly satisfied that the American Association, beyond being a business organization, as is the United States Chamber of Commerce, had nothing in common with trade unionism and had no intention of adopting trade union methods.

You say the membership of the American Association is apparently among the younger men in the field. If that is true, and it well may be, it is a good thing for the association and speaks well for its future. The American Association does not believe in its policy or its government being limited to those of the profession occupying high positions. It believes, as all pay the same entrance fee and annual dues, its governing council should be representative of all and it should be neither ruled by the rank and file or members of its superior grades, and that each and every one should be endowed with the same rights and privileges. In other words, its policy and its governing council are in the control of its members and are intended to express their desires and not, as is often the case, the desires and opinions of a select few who really represent but a very small minority of the profession as a whole.

You say the association has advocated standardization of

salaries and presented a standard wage scale to the wage board. Permit me to correct you; the association did nothing of the sort. It presented a sliding minimum scale for various positions, which is a very different thing. There is nothing in the association's recommendations, nor does it desire or believe in, restricting initiative or higher reward for ability or in making a position the measure of the compensation, but it does advocate a minimum within certain limits for certain positions, believing that if a man cannot earn that minimum he is not entitled to the position and should make room for some one who can.

I do not think, in view of the rapid monthly increase in its membership, that the American Association of Engineers requires a brief in its behalf, but as I believe your paper does not desire to intentionally mislead its readers I wish to correct what I believe is a wrong impression of the organization of the American Association.

W. W. K. SPARROW,

Corporate Chief Engineer, Chicago, Milwaukee & St. Paul; director, American Association of Engineers.

Heavy Loading of Cars

PITTSBURGH, Pa.

TO THE EDITOR:

The United States Railroad Administration, through its Car Service Section, has recently issued an appeal to the shipping public, inviting attention to the accomplishments and the policy of the Railroad Administration with regard to freight car conservation, urging shippers to continue their efforts towards bringing about improved transportation conditions by continued heavy loading and pointing out that this co-operation of shippers has been a very material factor in compassing: 1. An increased car supply; 2., lessened congestion on the railroads, particularly at terminal points; and 3., improved service made possible by such lessened congestion.

The 13 shipping companies of the United States Steel Corporation have conducted a vigorous campaign for the heavier loading of cars, and during 1918 the average carload shipments of these companies was 91,500 lb. per car. The average marked capacity per freight car in this country is only 80,000 lb., and the average carload of all railroads throughout the country on all shipments, including the traffic referred to, was only 58,200 lb. per loaded car, or an average of 33,300 lb. per car less than the record made by the subsidiary companies of the United States Steel Corporation.

While the 13 shipping companies referred to increased the average carload on outbound shipments during 1918 only 3,600 lb. per car, there was effected an actual saving of 63,828 cars, as compared with the loading for the year 1917, when the average was 87,900 lb. per loaded car. This does not include the cars loaded with iron ore by the Oliver Iron Mining Co.,—also a Steel Corporation subsidiary—all of which were loaded to the average of 50 tons per car. To include these would have tended to increase the average load, but would have been misleading.

Taking the average haul per ton of revenue freight throughout the country of the individual railroad as 166 miles, and the loaded freight cars per train as 25 cars, the railroads throughout the United States were saved 10,595,448 car miles, or 423,818 train miles; the 63,828 fewer cars used means that these cars were in other service and at the average freight revenue of 16.13 ct. the saving of this number of cars actually resulted in increased earnings to the railroads of \$1,709,045.76 without any increased operating expense.

During the last seven years, the 13 shipping companies of the United States Steel Corporation have increased the average carload from 69,200 lb. per car in the year 1911 to 91,500 lb. per car in the year 1918, an increase of 22,300

lb. per car, or 32 per cent, effecting a saving of 339,736 cars through the heavier loading of equipment.

The railroads, consignees and shippers themselves have been greatly benefited in the fewer number of cars switched and weighed, to say nothing of the relief from congestion on the railroads, particularly at terminal points, improved service made possible by lessened congestion, and the great saving in operating expenses that was brought about by the fewer cars, both empties and loads, that were kept out of the various classification and interchange yards of the railroads from point of shipment to destination.

This record proves conclusively the real value of conserving freight car equipment at all times, and if the shipping public generally would note the enormous saving in equipment that has been created by these companies with only 32 per cent increase in the average load in the period of seven years, how much could be accomplished if all shippers would adopt the United States Railroad Administration's rule of loading to 10 per cent above the stenciled capacity, or to firmly fix the rule to load to 100 per cent of the carrying capacity whenever possible.

J. FRED TOWNSEND,

Traffic Manager, National Tube Company.

Inequitable Sick-Leave Rules

NEW YORK CITY.

TO THE EDITOR:

I see no mention in your paper of an order which has just gone into effect on prominent roads affecting the compensation of employees who are paid by salary. These employees—draughtsmen, and clerks in engineering offices, clerks in other offices at headquarters, and many others—have had various benefits conferred on them by the supplements to the general wage order, but now a good deal of this is knocked over by a sweeping order providing that a deduction shall be made for any absence on account of sickness.

The justification for this order is, presumably, that a man who is allowed extra compensation when he works more than the normal hours, should equally be "docked" when he works less than the normal hours. To this the answer is that for nearly all salaried men the overtime provision is of no benefit; they never work overtime; while the deduction for illness in many cases will be a very costly matter. The net effect is a general reduction of salary.

Government employees, I understand, lose pay when off because of illness, but are allowed, in addition to the annual vacation, one day off a month. Railroad employees, under the new order, get the unfavorable end of this arrangement (the docking) and not the favorable end of it (the monthly allowance of a day off).

Consider the case of a salaried man who stays home for a couple of days with a cold, and for the next two weeks comes an hour early each morning and works on Saturday afternoon, to catch up with his work. Under the old arrangement, the usual American plan, his salary went on without interruption. Under the new order, he is docked for the days he is ill, and receives no allowance for the extra time he works to catch up; for under one of the "jokers" in the existing rules, there is no overtime allowance for the first hour of extra time in any day, nor for the first five hours of extra time on Saturday afternoon, in an office working the usual 38 hours a week.

Under the new rule, as anybody can easily predict, many a man with a cold or a slight digestive disorder will come to the office and mope around half sick, doing little work, for a week, instead of staying home for a day, as he would have done under the old arrangement, and getting cured up. The text of the order has not been given out, so far as I have seen. The persons to whom it applies are in general unorganized, and without means of making an effective protest against it.

E. D. C.



The Blockhouse on the Mexican Railway at Boca del Monte

A Trip Over the Railway Lines of Mexico

Situation Much Improved. Large Amount to be Spent to Replace Destroyed and Worn Out Equipment.

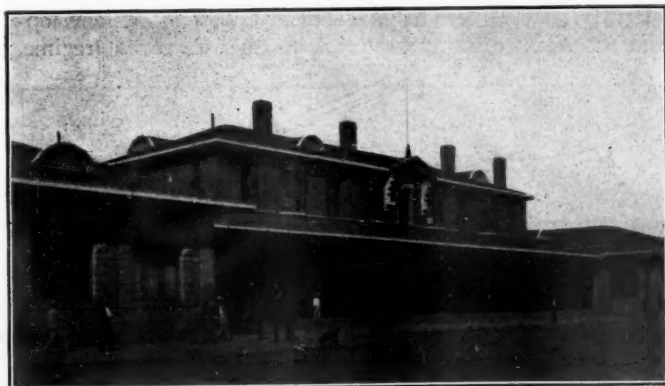
By P. Harvey Middleton

Executive Assistant, Railway Business Association

PART 1. GROWTH OF RAILWAYS AND PRESENT NEEDS

IT IS AN UNFORTUNATE FACT that the principal items of news from Mexico are reports of the activities of Villistas, Zapatistas, and Felicistas and of other rebels and bandits who infest certain portions of Mexico, and that the average American is convinced that Mexico is an industrial, physical, political and financial ruin. That this is far from the truth was strikingly emphasized to me on my trip through Mexico from April 11 to May 10.

When I was invited to make a trip over the railway lines



The Station at San Luis Potosi.

of Mexico under government control, I gladly availed myself of the opportunity to obtain at first hand facts and figures regarding transportation conditions. Leaving New York on April 8, we reached Laredo, Texas, on the morning of April 11. Here we laid over for a day. The Pullman Company will not at present allow any of its cars to cross the Rio Grande, and none of the American railway companies will permit their passenger or freight cars to go into Mexico. So on the morning of April 12 we crossed the river in an automobile to Nuevo Laredo and boarded the train of the National Railways of Mexico.

Our Pullman was a duplicate of the one we had traveled in from San Antonio to Laredo, and we began our journey

to the Mexican capital at 11 a. m. through a country which differed but little from that on the American side, for this stretch of territory is one of the few in the Mexican republic that does not show mountains against the skyline. The line traversed the deserts of the great plateau and passed through hundreds of miles of dry and treeless plains. En route we passed many freight cars in bad order, with holes roughly patched with pieces of wood or tin, and at Monterey, which we reached in the late afternoon, we saw 30 locomotive frames standing within the steel skeleton of what was apparently once a repair shop. Our military guard of 40 soldiers, which we had taken on at Nuevo Laredo, was changed here for a fresh set. These traveled with us as far as San Luis Potosi, and here the guard was again changed for the run to the capital.

The journey by rail from Laredo to Mexico City was made with no other delay than that occasioned by locomotive troubles on steep grades, requiring in consequence a few more hours than in the old days of almost clock-like precision of operation, when the roads were in perfect condition and rolling stock was abundant. The arable land in the northern portion of the republic, confined to narrow limits at best, is either under cultivation or being put into condition for production, and as the central portion of the plateau was reached, and the fertile valleys of San Luis Potosi, Queretaro, Guanajuato, and other states were traversed, a scene of agricultural activity was observed. Piles of ore at various stations indicated that mining is active.

The railway from Laredo to Mexico City was originally a narrow gage line, built under American auspices. It was opened for traffic in November, 1888, and the widening to standard gage was completed in 1903. The length of the main line to the capital is 803 miles, and it is the shortest route between the frontier and the capital. On the journey the train crosses the states of Tamaulipas, Nuevo Leon, Coahuila, San Luis Potosi, Guanajuato, Queretaro, Hidalgo, and penetrates the state of Mexico.

Many stations and a great deal of rolling stock were destroyed on this line during the revolution, but the government has rebuilt tracks, bridges and stations, has repaired

and purchased rolling stock, and is still repairing and purchasing more as the income warrants. The heavy expenses have been met with no other source of revenue than the ordinary business of the line, with the necessity of carrying military guards on all trains at heavy cost.

Mexico's Shortage of Railway Equipment

We arrived at Mexico City at 2 a. m. on Monday, April 14, and on the following day I began an investigation at the offices of the Mexican Government Railway Administration with the object of ascertaining the extent of the deterioration of the physical equipment of the railways under government control. At the end of three weeks I was able to construct a table showing the shrinkage in the railway equipment of Mexico since 1913, as the result of revolutions and the lack of material with which to repair rolling stock. This table is given below:

SHRINKAGE IN MEXICAN RAILWAY EQUIPMENT

	Metric tons	Number destroyed or condemned since 1913
Standard gage box cars.....	13.6 18.2 22.7 27.2 36.3	41 67 62 1,673 1,630
Narrow gage box cars.....	20.0 25.0 27.2 10.0 20.0 12.0 20.0	254 204 16 21 270 86 27
Standard gage cattle cars.....	18.2 22.7 27.2 36.3	11 4 399 309
Narrow gage cattle cars.....	20.0 10.0 27.2 12.0	45 11 5 13
Standard gage gondolas.....	22.7 27.2 36.3	23 407 592
Narrow gage gondolas.....	20.0 10.0 25.0	22 3 44
Standard gage hopper cars.....	36.3 45.4	20 151
Standard gage flat cars.....	13.6 22.7 27.2 36.3	12 25 176 502
Narrow gage flat cars.....	25.0 22.0 12.0	124 65 24
Standard gage coke cars.....	22.7 27.2 27.2 36.3	8 5 25 106
Standard gage tank cars.....	45.4 20.0 25.0	95 2 9
Narrow gage tank cars.....	25.0 13.6 18.2 22.7	16 82 15 61
Standard gage cabooses.....	11.5 10.0 12.0	11 28 5
Narrow gage cabooses.....	13.6 18.2 36.3 45.4	35 34 18 8
Standard gage ballast cars.....		
Standard gage passenger cars, combination first and second class.....		22
Narrow gage passenger cars, combination first and second class.....		12
Standard gage passenger cars, second class.....		55
Narrow gage passenger cars, second class.....		44
Standard gage combination, baggage, mail and express.....		38
Narrow gage combination, baggage, mail and express.....		19

Merely to bring the Mexican railways back to the state of efficiency existing under the American operating officials prior to the revolution it will be necessary to replace all the rolling stock mentioned above. In addition, it is estimated that there will be needed 87,500 tons of rails, accessories and supplies. Since 1910 revolutions have resulted in the destruction of over 10,000 freight cars. At the present

moment on the lines north of Mexico City there are 5,000 freight cars laid up awaiting material with which to repair them, as well as 400 locomotives and 225 tank cars.

In view of this situation, large purchases of supplies must be made within the next twelve months to keep the railways running. Purchases are being made constantly by the New York office of the Mexican Government Railway Administration, which has a bank credit of about \$250,000 a month for this purpose. Col. Paulino Fontes, general manager of the government lines south of Mexico City, is at the



This Section Car Is All That Was Left of the Equipment of the San Jorge Bay & Eastern, Sonora After a Rebel Raid

time of writing in New York with the object of increasing the funds available for this purpose, and in June V. L. Blanco, general purchasing agent of the lines north of Mexico City, will also visit New York to obtain prices for a large list of materials.

Growth of Railways

It may be well here to give a brief review of the development of Mexico railways prior to the Carranza regime.

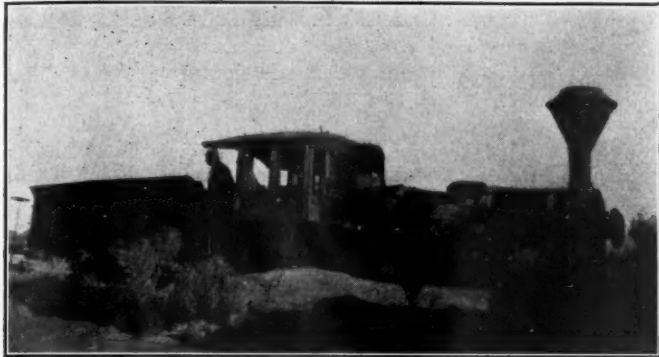


The Remains of the Round House of the San Jorge Bay and Eastern

Railway construction in Mexico started in 1854, when a line of ten miles was placed in operation between Vera Cruz and Tejeria. This line was gradually extended to the capital which was reached in 1873. From 1877 to 1882 Mexico built more miles of railroad than any other Latin-American country, the average yearly construction during that period being 428 miles. In 1905 the railway mileage

of Mexico amounted to 10,557, and in 1910 it was 15,260. There has been very little new mileage built since that date. Most of these railways have received subsidies from the Mexican government ranging from \$6,000 to \$10,000 per kilometer, according to the difficulty of the work.

In 1903 the Mexican minister of finance, Limantour, purchased \$5,000,000 of 4½ per cent second debenture stock of the Inter-oceanic Railway. This purchase led soon afterwards to a further investment by the Mexican gov-



How the Rebels Leave an Engine—Stripped of Its Brass and Other Metal

ernment in railway stock, this time with the express object of exerting its interests both on the policy and routine of the National Railroad Company, the stock of which was acquired by the government. Limantour visited New York and Europe in 1903, and while in the former concluded with Speyer & Co. an arrangement whereby the Mexican government became the owner of a block of shares of the National Railway which gave it a preponderating influence.

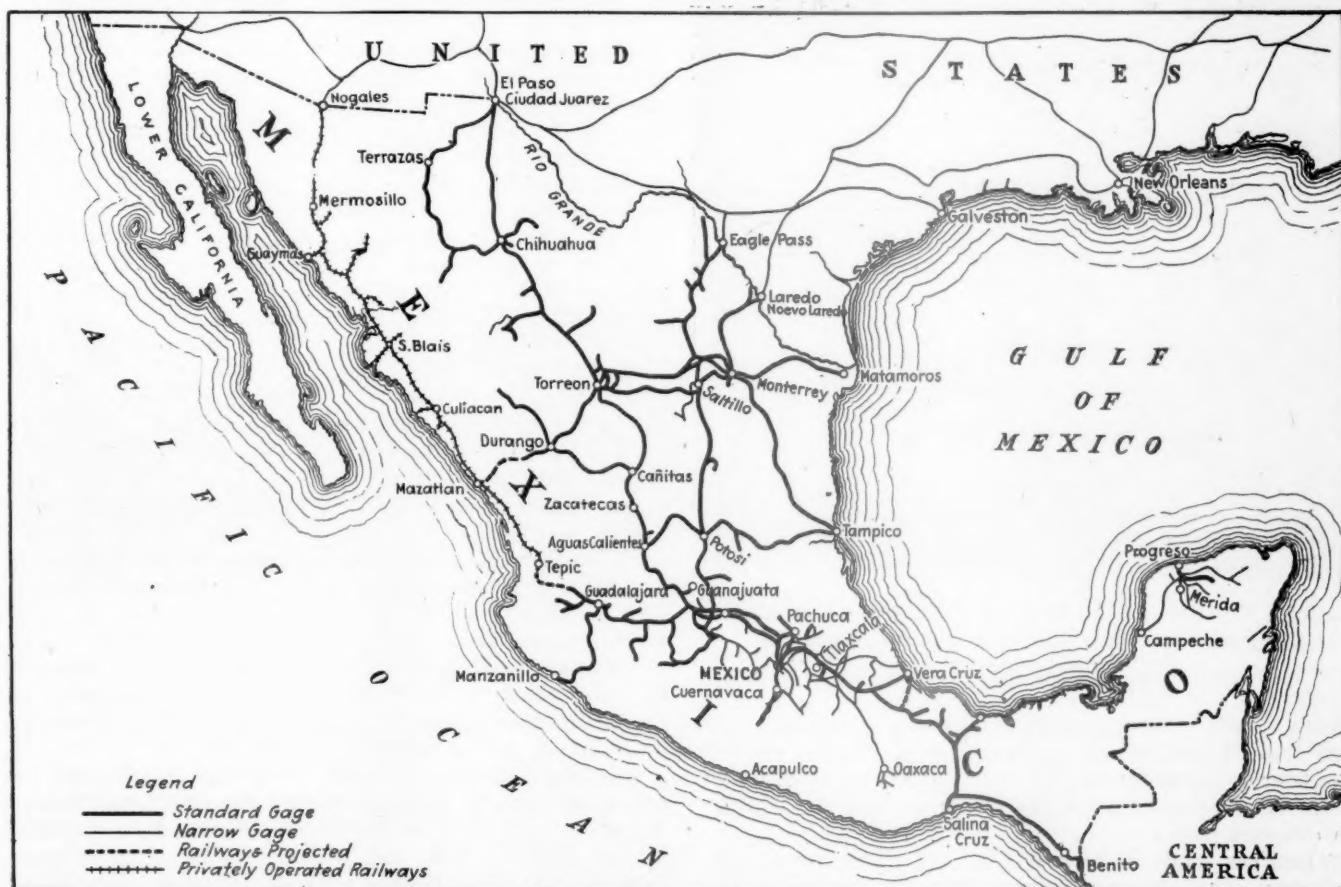
In 1908 the National Railways of Mexico was incorporated in the United States to take over and unite the properties of the National Railroad of Mexico and the Mexican Central.

The latter system, which thus became part of the National system, was incorporated in Massachusetts in 1880. The Mexican Government offered a subsidy of \$15,200 a mile, and the right was granted to import all materials for construction, repair and operation free of duty for 15 years, with the further right of exemption from taxation for 50 years, dating from the completion of the line.

The main line was built from Mexico City to Ciudad Juarez, 1,224 kilometers, branches and subsidiary lines bringing the total mileage up to 3,426 kilometers. The Central claimed that there were but four cities in the whole republic possessing anything over 5,000 inhabitants which were not served by one or other of its systems, main line branches, divisions or extensions. The largest and most important places outside of Mexico City itself which this railway serves are: Guadalajara, 125,000 inhabitants; Leon, with 70,000; Aguascalientes and Zacatecas, each with 40,000; Guanajuato and Queretaro, each with 45,000, and numerous other towns with populations ranging from 35,000 down to 1,000.

This railway serves the most fertile and productive portion of Mexico, carrying a great mineral traffic, and passing through the enormously valuable silver belt which formerly yielded one-third of the entire silver production of the world. It reaches manufacturing districts such as Jimenez, the cotton producing district of Lerdo, Torreon, where there are cotton mills; Aguascalientes, with woolen mills, silver and copper smelters, and also the location of the largest railway machine shops, and San Luis Potosi, with its population of about 60,000.

The International Railroad, now also a part of the National system, was started in 1882 by that great American



The Railways of Mexico

railroad pioneer, Collis P. Huntington at Ciudad Porfirio Diaz, and in six years it had reached Torreon. The next extension was to Durango, center of a rich mineral district, which was reached in 1902. Huntington surveyed the line from Durango to the Pacific port of Mazatlan, but it was never finished. The Mexican government has at present under consideration the completion of this line. Eighty miles have already been built west of Durango, but the remainder is in a mountainous region, where some 20 tunnels of various lengths and 30 large bridges will be required. It is estimated that the cost of the extension will be about \$15,000,000, but the expenditure will be warranted by the opening of a rich agricultural, mining, and timber region. The International at present serves the rich coal fields of Coahuila, and furnishes the outlet for the coal and coke of the famous San Esperanza mines. Two-thirds of the revenue of the mines is derived from its mineral traffic.

On these northern lines, all standard gage, trains are being run without interruption except in a few districts, notably the line from Chihuahua to Ciudad Juarez, where the Villistas are operating. At the time I was in Mexico (April 11 to May 10) trains between Monterey and Matamoros, Monterey and Tampico, and Monterey and Torreon, were being operated without interruption, although a train was blown up by bandits between Monterey and Tampico, and traffic suspended for one day on April 11. Freight and passenger traffic has been augmented to a large extent. From Saltillo to Piedras Negras the coal traffic has increased

oceanic, the Mexican Southern, and several smaller lines. The most important of these is the Mexican Railway, the first line to put Mexico in touch with the outside world, length 264 miles.

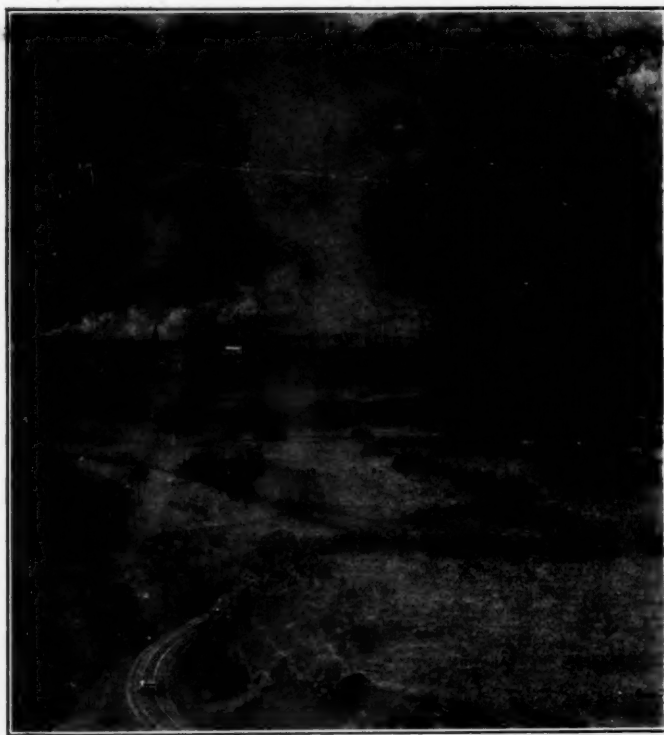
The Mexican Railway is operated today under conditions absolutely unique in railroading. Running through the rebel-infested state of Vera Cruz, it is protected throughout its length by a system of forts, or block houses. There are 70 of these block houses, each connected by telephone, one about every four miles, built close to the track, on raised ground, with watch towers, manned with Carranza soldiers. Ditches are excavated around each fort, and these ditches are protected by barbed wire entanglements strung at a reasonable distance from the trenches and around them.

A Trip Through the Danger Zone

Owing to rebel activities no trains are operated on this line at night. I boarded the train at the Buenavista station, Mexico City, on the night of May 7, and we pulled out at



Train and Tunnel on the Mexican Southern



Maltrata Mountain on the Mexican Railway Between Mexico City and Vera Cruz. The White Line on the Hill Is the Railway

greatly, while passenger traffic is large and regular. The line from Tampico to San Luis Potosi, which had been temporarily interrupted, had been restored to operation. From this city to Laredo traffic is normal and has been for an extended period.

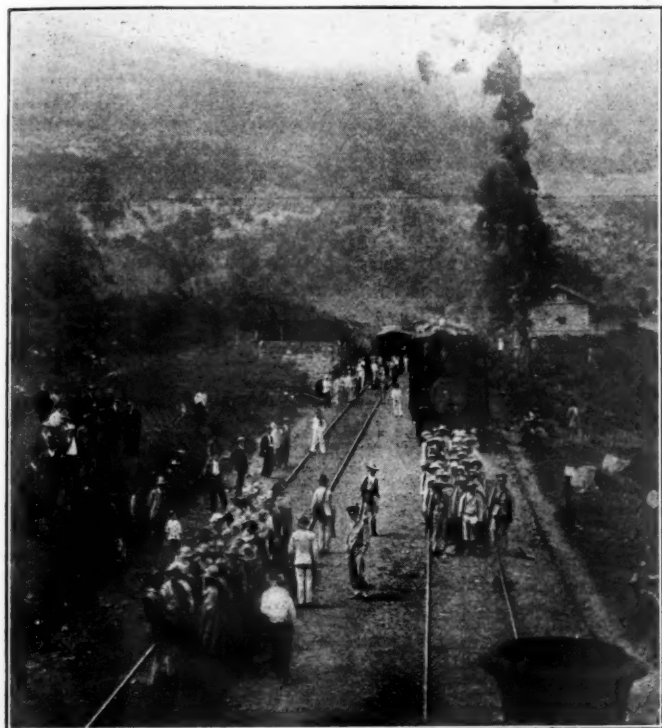
The lines south of Mexico City under government control are: The Mexican Railway from the capital to Vera Cruz; the Vera Cruz and Isthmus; the Tehuantepec National, the Alvarado Railway, the Pan American, the Inter-

5 a. m. with a military guard and made an uneventful run across the central plateau to Esperanza. On leaving this station we soon struck the most perilous part of the run through the mountains, a mile and a half above sea level, from Esperanza to Maltrata. The line is almost unsurpassed from a scenic point of view, ascending from the valley of Mexico to the summit of the Sierra Madre, reaching its highest point at Acocotla, near San Marcos, an elevation of 8,310 feet. At one point, at Alta Luz, the train is 2,919 feet higher than the topmost point of Mount Washington, and we looked down upon the valley spread out like a chessboard thousands of feet below, as the train plunged around dizzy barrancas, over spidery bridges spanning profound cañons, or along the curving roadbed cut in the solid rock of the mountain side.

All the way down the mountains we could trace the road, its serpentine trail drawn in and out of the valley and along the ridges, ever and anon doubling upon itself, but ever descending. At the Maltrata Incline the scenery is indescribable, the eye dominating a thousand square miles of mountain ridge and tropical valley, and from the car window it looks for all the world like the view from an aeroplane. One's mind shudders at the possibilities of a stick of dynamite carefully placed by a bandit at this point. A few days before at Las Vegas, in these same mountains, on the narrow gage Interoceanic Railway, a train was dynamited by Felicistas and a number of persons killed.

Reaching Orizaba, we notice for a mile or so along the line great piles of wrecked railway equipment, the twisted frames of cars of every description, engine frames, wheels by the hundred with and without trucks, eloquent testimony to past revolutionary activity. Here we were joined by what they call the "explorers' train" to protect us from rebel attacks through the heavily wooded sections between

this point and Vera Cruz. This train consists of a locomotive and four cars filled with soldiers, with soldiers also riding on the car roofs, fully armed, and ready for instant action. Our train followed behind, with another carload of soldiers on the rear. We soon reach the most dangerous pass on the line, going through a series of tunnels and then



A Carranzista Guard at Boka Station on the Mexican Railway Waiting for the Train They Are to Protect Between Mexico City and Vera Cruz

creeping gingerly across the Metlac Bridge, 350 ft. long, built upon a curve of 325 ft. radius, on a 3 per cent grade, 92 ft. above the river. Eight cast and wrought iron pillars on masonry bases uphold it, and when a long train is winding across it the horseshoe effect is very striking. Shortly after this we reached Cordoba, and from here to the coast the run was through level country, Vera Cruz being reached

being to construct a line from Vera Cruz on the Gulf to Acapulco on the Pacific, but the line, which is narrow gage, is still far short of its ultimate destination.

The Tehuantepec National, recently purchased from the Pearsons of London by the Mexican government, was completed in 1907. The total length of the line, which crosses the Isthmus of Tehuantepec from the Gulf of Mexico to the Pacific, is 190 miles. There is also a small branch line. Fine harbors have been constructed at the ports of Salina Cruz on the Pacific and Puerto Mexico on the Atlantic. Large warehouses have been erected for the storage of freight. At both places trains are run up to the ship's side, where there are electric cranes for loading and unloading. There is a fine dry dock at Salina Cruz.

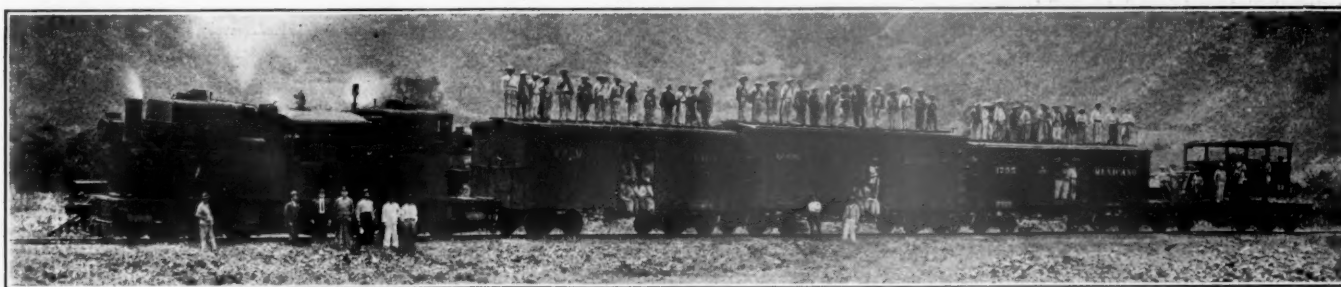
A large amount of traffic which formerly went around Cape Horn or across the Panama Railway now goes via Tehuantepec. This route is 1,200 miles shorter between New York and San Francisco than the Panama canal. Not only is it a shorter route to the Pacific ports of the United States, but to the Orient and Australia. Sugar cargoes, for instance, can be carried from Hawaii to New York via Tehuantepec, a distance of 5,305 miles, instead of carrying them around Cape Horn, over 12,000 miles. In the rebuilding of the Tehuantepec Railway and the improvement of the two ports \$65,000,000 has already been spent.

Equipment in Service

The following equipment is at present in use on the lines under government control:

Railways		Standard gage	Narrow gage
National Railways	Locomotives	767	295
	Passenger cars	497	258
	Freight cars	11,062	2,778
National Tehuantepec	Locomotives	47	...
	Passenger cars	12	...
	Freight cars	1,008	...
Vera Cruz & Isthmus	Locomotives	16	...
	Passenger cars	10	...
	Freight cars	193	...
Pan American	Locomotives	7	...
	Passenger car	1	...
	Freight cars	40	...
Vera Cruz to Alvarado	Locomotives	...	7
	Passenger car	...	1
	Freight cars	...	40
Mexican Railway	Locomotives	54	11
	Passenger cars	58	13
	Freight cars	569	105
Owned by shippers or rented to shippers	Locomotives	158	...
	Freight cars	3,263	...

The Central Railway was among the first in Mexico to



The "Explorers Train" Which Runs Ahead of the Passenger Train Between Mexico City and Vera Cruz

at 6:15 p. m., the journey from the capital having taken a little over 13 hours.

Other Southern Lines

The Mexican Southern Railway, also operated by the government, runs from the city of Puebla to the city of Oaxaca, and was built with British capital. Two years were spent in completing the line, which passes through an exceedingly difficult country. The track parallels the Inter-oceanic line as far as Amozoc. The Inter-oceanic Railway was incorporated in 1888 by a special charter, the idea

adopt oil burning engines, and today practically all the Mexican railways use them. There are a large number of storage tanks, and special oil tank cars used for carrying petroleum from the wells to these tanks.

The number of employees on the railways under government control in Mexico is 31,588, of which only 69 are foreigners. Gross receipts for the year ended June 30, 1918, of the government lines (8,119 miles), amounted to \$29,240,485 U. S. currency, and the operating expenses were \$19,151,808, net operating income therefore being \$10,088,677.

A Frank Talk on Railroad Labor Questions

Owners of Railroad Securities Should Be Prevented
from Getting Undue Share of the Profits

By Walker D. Hines
Director General of Railroads*

TO START WITH I want to tell you that my views with respect to the importance and advantage of organization in labor, have gone through a process of evolution. As you can well understand, with my early training I was naturally brought up to have serious doubts as to the desirability of labor organization at all. But long before I terminated my connection with the railroad companies my own powers of reasoning had led me to see that it was an inevitable and indeed a desirable evolution of civilization that there should be labor organizations to represent in a collective way the interest of the individuals who really do the work and produce the wealth of this world in which we live.

And I have come more and more to the conviction that it is the right thing and the advantageous thing, not only for the man who belongs to the particular labor order, but also for society in general, and indeed for business itself, that there shall be this effective method of representation for such an important element in the production of the wealth of the country. So that I approach the problems that have confronted me as director general in connection with labor matters with a spirit of entire cordiality toward the handling of these matters through labor organizations, and I am satisfied that they cannot be effectively handled either from the standpoint of the management or from the standpoint of society in any other way.

When we are dealing with such large problems as must be dealt with in the great industrial enterprise of the country, it has come to me by degrees, as I have thought over these things, that the classes whose interest needs to be considered primarily are made up of the human beings who do the work in this world, and of the human beings who are the ultimate consumers of the things produced in this world, and I don't think their interest can properly be represented except through the orderly processes of organization.

It is particularly a pleasure to me to have this opportunity to address one of the oldest of the labor organizations, and one which has been characterized throughout by a systematic and business-like method of procedure and particularly by strict observance of its own laws. And so I come before you to discuss the matters in a spirit of appreciation of the importance of labor organization in general, and especially in a spirit of admiration for the organization to which you gentlemen belong.

I feel that it is a part of the development of civilization that there must be an increasing participation on the part of the employees in any great enterprise in the management of the business of that enterprise. The old-fashioned idea that nobody was concerned in the business except those who furnished the capital has largely disappeared, and, of course, will have to disappear altogether because the people who furnish the work and who do the work are of the greatest importance in accomplishing the result and the business that is done is their business just as much as it is the business of the people who have furnished the capital. And there must, therefore, be a participation—there must be a voice on what is done on both sides on behalf of the people who do the work as well as on behalf of the people who furnish the money.

So that, believing that there will be that increasing participation on the part of the employees on these matters, I want to take advantage of this opportunity to tell you briefly some of the problems of this business in which, in a way, you are partners; and I think it will be of interest to you and it will be helpful to me to explain this situation.

With respect to the calendar year 1919, so far we have the tentative reports for three months, January, February and March, and even in those three months it appears that we have fallen \$192,000,000 short of earning enough to pay the rental for the three months. The public sees this deficit and it sees the fact of federal control, and it says the deficit is due to government control. I think the public is mistaken in reaching that conclusion. The conditions of this year are somewhat different from the conditions last year, but the reason for this deficit, as I see it, can be fairly stated in this way:

In the first place, the increase in the cost of materials and supplies has been felt to a much greater extent in these early months of 1919 than in the early months of 1918. In the second place, the weather has been unusually favorable, and an exceptionally large amount of maintenance work has been done. In the third place, the increase in wages has shown more fully in these three months than in the three months a year ago, and the increase in the operating cost, due partly to wages and partly to increase in cost of materials has been very much more than the increase in the rates.

I should say broadly, that our increased costs would vary on the different railroads from 50 per cent to 80 per cent or 90 per cent, or more, taking materials, labor, and everything that goes to make up operating cost, whereas the transportation rates have been increased a little less than 25 per cent.

The fact is that every one of us knows in his own domestic affairs, and in every other relationship, that the purchasing power of the dollar has been greatly diminished by the high cost which has been the outgrowth of the war conditions. The purchasing power of the dollar has been diminished to such an extent that the dollar and a quarter which the Railroad Administration now gets for transportation service for which the railroad formerly received one dollar, goes much less far in meeting its cost than the dollar did before.

That, though, is not the whole story. To a very large extent this unsatisfactory condition for the first three months of 1919 has been due to a falling off in business. The passenger business has kept up pretty well, and in some parts of the country has shown an improvement.

Generally speaking, the freight business has fallen off seriously. That has differed in different parts of the country. I just came back from Texas, where they are not only very optimistic about prospects of large crops, but they are also feeling the effect of an extraordinary oil development in the northern part of the state, and the result is that in some parts of Texas there is an increase in the freight business as well as in the passenger business. But taking the country as a whole, there is a very considerable loss in the freight business, and that has gone far to create this large deficit.

I find a disposition on the part of some elements of the

*From an address before the grand division of the Brotherhood of Railroad Conductors, St. Louis, May 19, 1919.

public to think that there ought to be an immediate increase in transportation rates in order to take care of this deficit, but we see sometimes a peculiar inconsistency on the part of the gentlemen who urge that. They say, on the one hand, that the increase in cost is due to government control and will not happen under private management; but they say, on the other hand, that we ought to have the increase in rates so that when the private managements do get the railroads back they will be able to take care of these increased costs. I find that inconsistency running through the minds of a great many people.

My own judgment is that there are too many temporary conditions to justify any definite action at the moment in increasing rates. We are going to get some additional economy in operation, a reduction in the cost of material, and undoubtedly a very large increase in business, and these things are going to operate to make the conditions more favorable. And my own judgment has been that until we can make a better survey of that situation we ought not to make an increase in transportation rates, and the reason I feel that particularly is that I feel that an increase in transportation rates will immediately be reflected in an increase in the cost of living.

Whenever there arises any reason for an increase in cost of anything, the public has to pay the amount of the increase, and the amount of the increase in the price is several times as big as the reason justifies. So, if after study of the matter, it is discovered that the government ought to have \$300,000,000 additional per year to pay the operation and rental, and increases the rates accordingly, there would be serious danger that after the increase had been passed along to the ultimate consumer of food and clothes and other things which we all have to buy, the public would pay a billion or a billion and a half on account of the \$300,000,000 the government would be getting, because the prices would be increased by the manufacturer and the wholesaler and the retailer. Hence I feel that in the interest of the general consuming public we ought to be exceedingly cautious about making the increase in transportation rates. While an increase of rates beyond the 25 per cent may be necessary to take care of increased costs running from 50 to 80 or 90 per cent, yet improvements in conditions may accomplish a great deal in wiping out the deficit without any increase in the transportation rates.

About a month or so ago, when the responsibility came to me of deciding upon the issuance of Supplements 15 and 16 to General Order 27, I was aware of the attitude that a large part of the public would take. With that tendency to quick and short-cut reasoning, I knew there would be a general disposition to say that the railroads were running at a loss and therefore under no circumstances should there be an increase in wages.

I felt, however, that this was a case where the government was bound to do equity and justice, and that if the conclusion was reached that an increase was necessary in order to give the employees, whom you and the other trainmen's organizations represent, a reasonable equality with other railroad employees, it was the duty of the government to do it; so I made those orders. And I undertook as far as I could to explain the situation to the public. My observation of the public has been that it has always failed to appreciate the important conditions which apply to the wages of the members of trainmen's organizations and to think that wages are all right, which are, in fact, decidedly below what they ought to be. And in the statement I made to the public I tried to point out the reason which I believe justified the stand that was taken.

There is a matter that is of very great interest to you that I want to speak on briefly, and that is the matter of punitive overtime in road service; of course, you under-

stand when Supplements 15 and 16 to General Order 27 were issued I explained that I wanted that matter considered by the Board of Adjustment No. 1. Accordingly, the matter was referred to the Board of Adjustment No. 1 for a report, and I had hoped there would be a report from that board which would be exceedingly useful to me in reaching a conclusion. The Board, however, was not able to agree on a report and has submitted two separate reports which do not aid me in reaching a conclusion on this important subject. So that I have the responsibility, without the aid of the advice I had hoped to get from the board, to decide this very important question, and I will have to exercise that responsibility and make a decision.

Punitive Overtime

I want you gentlemen to bear in mind that that is a very serious responsibility. On the one hand, it is my duty, and I have in mind to see that justice is done to you gentlemen and your associates in the train service.

On the other hand, it is a question in which the general public also is interested. In view of the deficit which I pointed out to you, the condition is such that, in all probability, if there should be any increased cost on this account it would have to be met by an increase in rates, and therefore, whatever I do, I must be in a position to justify myself before the public which will have to pay those increased costs. I could not decide this matter without saying that I had investigated it and saying that I knew what it was going to cost. I must make such an investigation as will enable me to go before the public just as I did in regard to Supplements 15 and 16, knowing what the prospect was as to what it would cost and the reasons why it ought to be done.

Now that investigation is going forward and it is not going to be allowed to drag, and just as soon as possible, I am going to meet this very important and very difficult problem and announce a decision. In that connection I would like to remind you that the advantages which have come from government control of the railroads, to the employees of the railroads, have also been accompanied with some disadvantages. We never can in anything have the advantages without the disadvantages.

Now, as I look at it, more progress has been made in the recognition of the just rights of labor since federal control of railroads began, than was made in 20 or 25 years before that. I think it is one of the great milestones in the progress of civilization.

That has come about because the government could deal with the matter in a unified way and because the government felt that it must deal with these matters in a just and nondiscriminating way as far as possible. The fact that the matter is dealt with in that way does involve some delay, but after all it does not begin to equal the delay that was encountered under old conditions, and the results produced have been vastly greater. But still it is true that in any particular matter which the government has to deal with here, there might be what may be regarded as delay. That is partly due to the fact that when we try to deal with a matter for the entire United States, it is indispensable that report shall be obtained from many different railroads and shall be considered by the various agencies that we have created, and it takes some time to get the views of the different men that are to be consulted, because no one man has the physical power or the mental power to deal with all these matters. And in addition to that, when it gets to the director general, there is a question of physical limitation on his part. It is a question of how many hours there are in the day and how much can be done.

In general, I want to tell you that we are working all the time to try to get a more expeditious settlement of the

current labor problems that arrive. The work is tremendous. It had to be organized in a very hurried way. Nothing like it had ever happened before. Here are 2,000,000 employees, all their rights and grievances were concentrated on one responsibility, that responsibility being that of the general government. We had to organize various agencies to deal with these matters, because no one agency could deal with all of them. The organization of those agencies has been an experimental matter. We had to experiment and feel our way and find that some organization was not as good as we thought it was going to be, and that perhaps a different organization would be better. We have to try to avoid one clashing with another to some extent, and it is difficult to define their separate functions, so we have had to feel our way in this matter. We are still very much alive to the necessity of developing still further the organization which we have to deal with these problems, and this has been a matter of great consideration to me on this trip which I am now finishing, and I am hoping that by degrees we will perfect still more the agencies we have created to deal with these labor matters.

While I have dealt with these practical details, I hope you will appreciate a thing that is very clear to me, and that is, my cordial support of this great movement which was inaugurated under federal control and which has already made such progress in the recognition of the rights of the employees to operate the railroads. I think it is a great achievement of civilization, and I am glad to have had a part in it, and I hope that I can continue to promote that movement and to see the realization of further important results in the protection of the just interests of the employees of the railroads.

Now, in conclusion, gentlemen, I want to ask your help in another matter. I have been, as I have had the occasion to do so, appealing to the railroad employees to do everything in their power to increase the efficiency and productiveness of the Railroad Administration because I feel so strongly that whatever can be accomplished in that work is something gained for the people in general.

Of course, under federal control, if there are any profits, they belong to the government, and if there are any losses they have to be sustained by the government and eventually be paid by an increase in the rates which the public has to pay. My own judgment is that, however this general railroad question shall be solved by the Congress, there will be a solution which will make sure that in the future the profits earned by the railroads will be so regulated as to prevent any undue share of those profits going to the owners of railroad securities.

I think that two things, broadly, should be secured. One is a reasonable assurance of a net return to protect the situation, and another is an equally effective assurance that any additional return shall not go entirely to the holders of the railroad securities but shall be shared with the public in some proper form.

So that whatever can be done by railroad employees in increasing the efficiency of railroad operation will not only help in this period of federal control to protect the public, but, in my opinion, will continue to protect the public after that, because it will help to keep down the rates of transportation, and whatever can be done to keep down the rates of transportation will go far towards keeping down the cost of living and helping it get down from its high level. So that anything you gentlemen can do, either by your own work or by presenting an example to other employees, to increase the efficiency and to save waste, will lay a foundation for further protection of the general public through the prevention of unnecessary increases in rates, which, as I say, will be translated into several times that increase in the cost of living.

Orders of Regional Directors

PASSENGER Fares for War Industry Workmen.—Order 204 canceling Order 50 of the Southwestern regional director states that the current basis and authority for these fares is contained in the Western Passenger Traffic Committee's circular B-190, issued January 6, 1919.

Peddling in Cars by Soldiers.—The regional director, Eastern region, by circular 1600-158A751, promulgates a warning, received from the War Department, that men in uniform, presumably discharged soldiers are peddling and panhandling on trains. Such practice must be stopped.

Pass Restriction, Pennsylvania Trains.—By circular 215 the Southwestern regional director advises that only white passes issued personally by the director general will be honored on the "Broadway Limited" and trip passes will not be honored on that train unless specially authorized.

Railroad Business Mail.—Circular 212 of the Southwestern regional director refers to Circular S. V. 9 of the American Railroad Association. Under this it is permissible for one railroad under federal operation to carry traingrams for a second railroad under federal operation even though such traingrams pertain only to the business of the second railroad.

Car Hire Accounts.—The regional director, Eastern region, by circular 600-2—37A753, gives supplementary instructions for the settlement of passenger and freight car hire accounts, especially with the so-called "short line" railroads. Industrial railroads should not be considered as industrial common carriers, unless they have been definitely determined to be such by the Interstate Commerce Commission.

Tax on Service for Telegraph Company.—Order 205 of the Southwestern regional director calls attention to a letter from the manager of the telegraph section which states that the treasury department has ruled that the tax imposed by Section 500C of the revenue act of 1917 concerning interchange services performed by railroad and telegraph companies does not apply to railroad and telegraph companies furnishing for each other services which are necessary in the conduct of the business of each as a public utility.

Exchange of Telegrams with Short Line Railroads.—The Southern regional director, File 1635-14-6, directs that the cost of sending telegrams to short line railroads in connection with business in which the federal operated railroad and the short line railroad are mutually interested, shall be assumed by the sending line. This policy is to be observed by railroads charging telegrams to free telegraph allowance or by paying for them at commercial rates. Where a railroad has no free telegraph allowance available, arrangements should be made to send messages over railroad wires.

Bills of Lading for Shipments for Cuba.—The Southern regional director in circular 437, says that shipments of freight consigned to Cuban destinations may be taken under through export bills of lading via South Atlantic or Gulf ports, or under domestic bills of lading applying to one of these ports "for export." A domestic bill of lading applying through to Cuban destinations must not be used.

Prepayment of Watermelons.—The Southern regional director, in circular 438, calls attention to the Department of Agriculture's action in starting a campaign against the watermelon disease known as the stem-end rot. The fungus is prevalent in the South Atlantic states, and nearly 3,000 cars of melons were lost in 1918. A simple bluestone treatment applied to the cut stem at the time of picking or loading is found to be a preventive. The Department of Agriculture has asked the carriers to issue instructions that all shipments of watermelons from Florida, Georgia and South Carolina be required to be prepaid through to destination unless treated for the stem-end rot.

Recent Developments in Railroad Tie Situation

Large Deliveries Are Rapidly Eliminating Acute Shortage of a Few Months Ago. Present Outlook Promising

ARE THE ROADS going to be able to secure enough ties for their requirements this year? This is the question which has given maintenance of way officers most serious concern during recent months. That there has been a shortage, so acute as to be alarming, few will deny. That this condition has been relieved greatly in many areas during the last few weeks, is equally certain. However, this recovery is so recent and the shortage is still so serious on a number of roads that it is felt by many railway men that all danger has not yet been removed.

Shortages of Basic Track Materials

Ties and rails are the two basic and most essential materials in track construction. With adequate supplies of these, tracks can be maintained in safe condition; without them this is impossible. Following the inauguration of federal control of the roads, the railroad administration took over the purchase of both of these supplies. Their delivery to the roads has therefore been the province and problem of the Division of Finances and Purchases.

At the time the Government assumed the control and operation of the roads, the steel mills were behind in their deliveries of rails, while large tonnages were on order for delivery in 1918 and 1919. At the same time we were in the midst of the war, and the steel mills were diverting their maximum output to meet military requirements. This led to a marked reduction in the tonnage of rails rolled. As a result only 1,097,277 tons or 7,431 track miles of new rails were laid in 1918, as compared with 1,233,031 tons, or 8,233 track miles laid in 1917; 1,450,952 tons or 9,831 track miles laid in 1916, and a normal average of about 1,600,000 tons.

A similar deficiency has been experienced with reference to ties, although it has been brought about largely by other causes. In 1918, the number of ties placed in tracks was 78,958,224, as compared with 81,154,529 in 1917 and 90,140,076 in 1916. In other words the tie renewals in 1918 were only 88 per cent of those in 1916, while only 76 per cent as much rail was relaid. The tie situation is even more serious than is indicated by these figures, because of the depletion of the surplus normally carried in stock. It requires several months to season a tie ready for use, and some roads which treat their supply normally carry a year's requirements on hand. With the curtailment in production which occurred last year, this reserve stock was drawn on heavily and on many roads practically to the point of exhaustion to make the renewals shown above. On January 1, 1918, the roads under Federal control had on hand 38,528,530 ties, while one year later this stock had been reduced to 29,576,958, a decrease of 26 per cent.

It is because of these conditions that those in charge of track maintenance have shown so much concern over these deficiencies in the supplies of rails and ties. This is particularly true of ties for while rails can be produced quickly if occasion demands several months are required to get out and season a tie after it is cut in the forest, and even longer if it is to be treated. Because of this concern we present the following discussion of the present tie situation and the causes contributing to it.

Early Activities of Central Purchasing Division

Prior to the inauguration of federal control and the centralization of purchases of ties in the Division of Finance and Purchases, the roads negotiated directly for their ties

with a variety of classes of sellers. Many roads bought all or a part of their ties from small producers on their lines. Where they had to go beyond their own lines they usually negotiated with contractors of larger output, although the Baltimore & Ohio sent its own tie agents onto foreign lines to purchase direct from the small producers. In the states along the Pacific coast, the production was secured almost entirely from the large operators who made their own ties. In the Appalachian, Ozark and Arkansas areas, probably 50 per cent of the production was handled by brokers who collected the output of small producers and sold these ties to the roads, some firms being both brokers and producers. In many instances these brokers advanced the money for the purchase of timber or supplies, taking their pay in ties. Again some contractors served primarily as tie purchasing agents for the roads, others had exclusive contracts, while still others sold their ties on specific contracts for definite numbers at a fixed price or on a cost plus basis.

These were the conditions prevailing when the Government took over the roads on January 1, 1918. At this time, following decreasing deliveries, prices were advancing rapidly, being raised as much as 25 cents per tie at a time in some instances. There was also active competition between roads for ties and some of the more prosperous lines were out-bidding the smaller roads for the ties produced along the latter lines, thereby taking from them their normal supplies. This also materially increased the cross hauling of ties. The situation was rapidly approaching confusion when about February 1, 1918, one of the smaller roads in the Southern region protested to the regional director regarding the action of a larger road in buying ties away from it along its lines. The regional director presented this protest to a meeting of his staff at which it was referred to the regional purchasing committee for consideration. About the same time a similar protest originated in the Western district where one road purchased all the ties off the lines of another road at an increase of 75 cents per tie in prices.

Before the regional purchasing committee had taken any action, the situation came to the attention of the director general, and he issued arbitrary instructions on March 13 to the effect that no road could pay more for ties than it was paying on December 31, previous. In view of the increases which had taken place in the interval between these dates, compliance with this order brought the purchase of ties to a standstill and many roads canceled all orders, although some roads disregarded this instruction insofar as purchases along their own lines were concerned. This order threw consternation into the ranks of the tie producers for no consideration was given to the ties produced on contracts or other assurance of higher prices and not delivered on the date of the order. Therefore all production of ties was also stopped. Impressed by the acuteness of the situation, the purchasing agents in the Eastern region met to consider the problem and decided to interpret this order as permitting the continuance of payment of the prices in effect on March 13 for ties produced along the lines of the purchasing road.

About this time the Forest Products section of the Central Purchasing Committee was created to handle the purchase of all ties and timbers required by the roads under Federal control. One of its early acts was the issuance of 12 basic principles to govern the purchase of ties, among which were the following:

No railroad under control of the Director General may

purchase ties on any railroad not under its control with which such road connects.

Any railroad under control of the Director General may purchase ties on any railroad not under his control with which such railroad connects.

The prices shall be fixed on the various lines by the individual railroad companies, subject to approval by the Regional Purchasing committee, and at such figures as will cause the production of a sufficient number of ties to meet the requirements of all the railroads.

Every railroad should endeavor to secure the maximum output of ties on its line, so that its own requirements can be met with the minimum amount of transportation.

Ties on railroads which produce more than are needed for their own use, should be transferred under the supervision of the regional committees to railroads on which a shortage exists.

Prior to this time data were compiled relative to all unfilled orders for ties held by contractors. This investigation showed that it was a common practice with some contractors to allow certain orders to remain unfilled if they were able to negotiate new contracts at higher prices on which they concentrated their output. The Central Advisory Purchasing Committee therefore arranged to take over all outstanding contracts and issued the following instructions early in May:

"1. All contracts or orders for cross ties placed prior to government action March 13, 1918, must be handled on their merits. Roads having such contracts or orders unfilled should immediately take up with the contractors the questions of completing shipment by June 15.

"2. There may be old contracts made at low prices that should be revised. In such cases the committee will consider such recommendations as the roads submit. In the event of any question as to adjustment of price, the matter should be taken up direct with the contractor and if an increase is warranted, the recommendation of the road interested should be submitted for approval to the Regional Purchasing Committee with full explanation.

"3. The receiving roads will continue to take up and inspect the ties the same as heretofore. It is hoped that all such contracts or orders as are not completed by June 15 should be given special consideration at that time as to the best means of handling and completing them.

"4. All embargoes on ties to be shipped from one road to another should be lifted and the ties moved as soon as possible.

"5. The road on which ties are produced will give every assistance possible to secure prompt completion of such orders and contracts.

"6. If there is any shortage of cars for moving ties, the matter should be brought to the attention of the regional director."

In June further instructions were issued canceling contracts for ties produced on foreign lines where this could be done, the local roads taking them over and accepting the ties.

Uniform Specifications and Prices

Up to this time ties were being purchased in accordance with the specifications of the different roads and in accordance with their inspection. There were therefore almost as many specifications as there were roads in the market, while there was an equal diversity of practices in the enforcement of inspection. The result was an entire lack of uniformity as to standards of manufacture, one road accepting as of relatively high-grade ties which another road rejected.

With the concentration of purchases of ties in the Central Purchasing Committee, it was a logical step to introduce standard specifications and standard inspection. Accordingly on June 11, standard specifications were issued, effective July 1, accompanied by uniform instructions for inspection. These specifications, which were published in the *Railway Age* of July 12, 1918, established five grades of both sawed

and hewn ties and included ties for use with and without treatment. Their principal differences were in the reversion of the order of classification in common use, so that a No. 1 tie is now the smallest accepted, and in the establishment of a 6-in. by 6-in. pole tie or a 6-in. by 7-in. sawed tie as the smallest complying with the specifications.

Following the preparation of standard specifications and as a corollary to this step, was the establishment of uniform prices for the different classes of ties. These prices were established by the regional purchasing committees, subject to the approval of the Central Purchasing Committee, and are in general uniform for a given class of ties throughout a region, although they are being revised from time to time to meet changing market conditions. These prices have been fixed largely on the basis of the relative service life of the different classes of timber, a practice somewhat at variance with that of some roads which had accepted certain woods to the exclusion of others. These prices are paid alike to the large contractor producing many ties and to the small farmer cutting a few. To protect the producer during the interval between the cutting of a tie and its delivery, he has recently been assured of the maintenance of the present prices to June 30 in the far west, to September 30 in the Eastern region, and to December 31 elsewhere.

Following the establishment of uniform prices, they were posted throughout the tie producing areas in an effort to stimulate production among the small woodsmen. By this step the broker was largely put out of business for the producer, knowing the Government price, was not inclined to sell to another party at a lower figure. As a further aid in stimulating production, steps were taken to pay for ties promptly on delivery and acceptance.

In distributing the ties to the roads, the aim is to deliver them at the point of use as cheaply as possible, all factors, including transportation considered. All ties are inspected by the forces of the road along whose lines they are produced. A road requiring more ties than are produced along its lines makes requisition on its regional purchasing committee which places it with other roads in its region if possible or if not, forwards it to the Central Purchasing Committee which refers it to a purchasing committee in another region. As far as possible the Central Administration distributes the surplus ties of one region through the engineering assistants to the regional directors, although in some regions they are distributed to the individual roads direct from Washington.

Early in its activities, the Forest Products Section recognized the value of tie treatment and arranged for the continuance of this practice where it had been followed under private control and for its gradual extension to other roads. One of the early effects of the war was to shut off the importation of creosote oil from Europe. This resulted in a shortage of preservative materials in this country which forced many plants to close down. To maintain the output of treated ties at the maximum, the Forest Products Section took over the distribution of creosote late last fall, and since that time it has been alloting it to those commercial and railway-owned treating plants prepared to treat cross ties. It has also prepared and put into effect standard specifications for the treatment of ties by the different processes in common use. In this way it has been possible to operate more plants and more nearly to their capacity.

Attitude of Tie Producers

It is not to be expected that such radical innovations as have been introduced in the tie industry could be put into effect without criticism from those affected by these changes. The criticism has been very acute from the tie brokers, who are largely put out of business. It has also come from many tie contractors who have had to revise certain of their meth-

ods, and from railway men who blame the Central Purchasing Committee for the failure to receive the ties they require for the proper maintenance of their tracks.

The hostility of the tie producers was incurred first by the issuance of the order on March 13, referred to above, limiting the prices which could be paid for ties to those which had been in force on December 31, previous. Coming as this did without previous announcement and in the face of rapidly rising prices for practically all commodities, its result was to bring tie production practically to a standstill and to confront producers, who had incurred higher costs with the knowledge and consent of the purchasing roads, with the prospects of large financial losses. While this order has since been superseded, this sudden and arbitrary action, which is now generally admitted to have been ill-advised, served to create an antagonism towards the Central Purchasing Committee which has resulted in hostility to many of its later acts, more acute than those measures themselves warranted and has contributed directly to the curtailment of production.

One of the points at issue between the railroad administration and the tie producers is the recognition of the small producer. The tie contractors believe the practice of the Railroad Administration to be unfair towards them when it pays the same price to the small farmer who brings out a wagon load of ties produced during spare time as to the contractor who has invested a large amount of money in timber holdings, in equipment and in an organization. Furthermore, looking into the future, when the ties are cut from the wood lots along the tracks the farmers' source of supply is exhausted, while the tie contractor has the organization to go further back to new areas and get out ties. Also in the absence of a contract as at present, a contractor hesitates to organize on a big scale even though prices may be guaranteed for some time in advance as has recently been done.

The contractors and particularly the brokers, also criticize the action of the Railroad Administration in appealing to the small producer. By posting the prices paid all through the timber, it became impossible for the brokers to purchase ties from the small producers at prices which would enable them to make a profit. Many of these small producers in the Southern states were dependent for credit for timber holdings and for supplies on these brokers and with the removal of this credit they were forced into other work, and this output has been lost.

In justifying its attempts to stimulate production by appealing to the small producers, the Railroad Administration points to the large number of unfilled contracts in existence a year ago, and to the steadily decreasing output in practically all regions prior to the period of Federal control. It is further pointed out that in the Cumberland and Tennessee river areas and in the Pocahontas region where no changes in purchasing methods were introduced in 1918, the contractors were able to produce but little over 50 per cent of a normal supply. From the standpoint of the Central Administration it was therefore necessary to develop new channels of production.

Another point of difference lies in the fixing of prices uniformly over large areas or entire regions in disregard of freight rates. The contractors urge the establishment of prices at certain primary receiving points as at St. Louis and the Ohio river, the prices in the interior being below these figures by the amount of the freight. They maintain that competition buying in the past has been on this basis and has fixed the value of their stumpage. Now with uniform prices in the timber a foreign road is paying prices for ties varying as much as 25 cents, owing to the difference in freight charges. Furthermore, with various prices prevailing in the different regions, there may be a difference in

price of several cents per tie between nearby points in adjoining regions.

Although there was considerable opposition at first to the standard specifications this was largely due to the underlying hostility previously engendered and has now largely disappeared. It was increased in some instances by the unwise or over-zealous interpretation of their provisions, a problem inherent to the training of a corps of 2,500 inspectors to a new system of operation. A point of controversy at first was the raising of the dimensions of the smallest tie coming within the limits of the specifications, the contractors protesting that this increased the wastage in the forests. When it was explained that the intent of the specifications was to discourage the cutting of small trees, and that ties smaller than No. 1 cut from the tops of trees producing larger ties would be accepted as usable rejects; this objection largely disappeared. At the present time, the majority of the tie producers feel that the uniform specifications are working to their benefit as well as that of the roads.

The position of the tie producers on the entire situation as expressed by a committee of their organization, the National Association of Tie Producers, in a recent appearance before the Division of Purchases at Washington is that roads on which ties are produced should continue to purchase at present prices such ties as are offered up to November 1; that any railroad may immediately enter into contracts with individual tie producers at prices not to exceed those now in effect at point of shipment up to November 1, provided the quantities and kinds of ties contracted for are approved by the Railroad Administration; that all cross ties should be inspected by regional inspectors at the point of shipment, and that the purchase of cross ties for delivery after November 1 should be made in accordance with the following plan:

1. The railroads should register their annual cross tie requirements with the Division of Purchases and all ties should be purchased in accordance with national standard specifications.
2. All ties should be inspected by regional inspectors in accordance with standard rules for application of the specifications.
3. Individual roads should enter into contracts for their tie requirements direct with responsible tie producers, filing copies of the contracts with the Railroad Administration.
4. All contracts should be awarded only after fair and open competition has developed the lowest price per tie obtainable from responsible tie producers.

Present Situation Is Encouraging

So much for the past and the causes contributing to the shortage. What is the situation at present? This can best be indicated by the statistics of ties purchased for recent months. Those for August, 1918, to March, 1919, inclusive, are as follows:

August, 1918	3,700,009	December, 1918	5 652,572
September, 1918	3,827,974	January, 1919	5,827,769
October, 1918	4,522,580	February, 1919	7,994,000
November, 1918	4,830,871	March, 1919	10,150,000

In the six months ending with March of this year, the purchases by regions have been:

Eastern region	2,793,792	Northwestern region.....	10,847,977
Pocahontas region	1,155,171	Central Western region..	2,265,079
Southern region	11,143,048	Southwestern region	7,607,463

An interesting feature of this improvement is the large increase in the local production in the eastern states which were not commonly considered tie producing areas. A conspicuous example of this is the production which has been developed on the Pennsylvania Lines West of Pittsburgh where 199,377 ties were purchased in the first four months of this year as compared with a total of 68,563 ties purchased during the entire year of 1918, and 19,311 ties in 1917. In the first three months of this year the purchases in the

Eastern region were 260 per cent of those for the same period of the preceding year, although in fairness to this comparison it must be recalled that this period of this year was one in which there were favorable weather conditions, while at the same time a year ago the winter was one of unusual severity.

In general the ties have not been diverted far from their natural channels, although because of the acute shortage on the Eastern roads and an over-production of Douglas fir ties in the far west, approximately two million ties have been ordered from that region, one-half of which are being moved to points along the Atlantic seaboard by water, and the remainder are coming by rail for distribution to the eastern central states.

With normal annual requirements for renewal purposes of approximately 90,000,000 ties or a monthly average of 7,500,000 ties, it would appear that the crisis has been passed and that we are now assured of an adequate supply of ties. In fact, it is the hope of the Forest Products Section that not only will the roads receive all of their ties which they require for normal maintenance, but that they may also be able to replenish their depleted stocks. Others, equally gratified at the purchases of the last two months but less optimistic, point to the fact that the large deliveries during February and March have been facilitated by a number of conditions which may or may not continue. In most of the tie producing areas the past winter has been one of the most favorable ever encountered in the history of the industry with the result that it has been possible to make and to haul out to the railroads larger numbers of ties than ever before. Furthermore, although several weeks and frequently months normally elapse from the time ties are cut until they are delivered to the railroads, this period has been greatly decreased during recent months, because of the fear that the present high prices might be lowered at any time. Likewise, the conclusion of the war and the return of large numbers of men to civil life has created a surplus of labor in many regions, and this labor has been diverted temporarily to the production of ties. However, the evidence leads strongly to the conclusion that at least the urgent needs will be met.

The influence of these increased deliveries is being felt rapidly by the roads to whom the ties are being sent. One road which was in a bad way for ties early in March reported late in April that the deliveries during the intervening weeks were sufficient to relieve the situation materially. Another road using treated ties, the officers of which were equally alarmed last winter now state that the only alarm now existing is that there may be an over-production of treatable ties beyond the capacity of the treating plants to treat them.

In the Northwestern region the situation on April 1, 1919, has been tabulated as follows:

PRODUCTION	
Ties placed in track since January 1, 1919.....	1,200,000
On right of way available for immediate use.....	9,300,000
At treating plants awaiting seasoning and treatment.....	1,900,000
Estimated production for balance of year.....	14,700,000
Oak ties due from other regions.....	4,000,000
Total available ties in Northwestern region for 1919.....	31,100,000
DISPOSITION	
Renewals—Northwestern region	17,200,000
New side tracks and other construction.....	1,000,000
For seasoning and treatment at treating plants and for carry over for 1920	6,200,000
Export to other roads.....	6,700,000
Total	31,100,000

In the Southern region which is one of the principal tie producing regions it is estimated that the production in 1919 will be about 35,000,000 ties, or in excess of that of

any previous year, although this is considerably short of fulfilling the program of the Forest Products Section for 44,000,000 ties, about one-half of which are scheduled for use on roads within the region and the remainder for shipment to other regions.

Large as the production of ties is in this region, this in itself is creating a special problem because of the large percentage of the ties now being produced which require treatment before insertion in the tracks. Nearly all of the roads in this region have been using ties untreated and they have neither the facilities, or in general, the desire to go to treated ties. In past years a large part of the ties shipped to roads in other regions have been of white oak and heart pine which were used untreated. This condition combined with the present demand for ties for immediate insertion in the tracks has depleted the supply of ties which can be used without treatment, while it is creating a surplus of treatment ties which will not be available for use until late this fall or early next spring, because of the time required for their seasoning and treatment. This condition is causing the Forest Products Section of the Railroad Administration and others to give serious attention to the encouragement of the use of treated ties.

Favorable as recent developments are the fact that the acuteness of the situation has not been relieved universally is indicated by the report from another road whose annual requirements are in excess of 2,500,000 ties and which was able to insert less than 1,500,000 ties last year, while at the same time reducing its surplus 500,000. For the first four months of this year only 20 per cent of its 1919 requirements had been received, while only 4 per cent of its renewals had been completed on April 1. This condition exists in spite of strenuous efforts which have been exerted by officers of the roads and others to promote local production with marked success, over 60 per cent of the ties secured since January 1 coming from its own local sources of supply.

One interesting development of the centralized purchase of ties has been evident on some of the smaller roads in the tie producing regions. In the past it has been the common experience that the larger and more prosperous roads would buy the better grades of ties from their lines, leaving to these roads the poorer ties which they could secure at cheaper prices. Under common control these roads are now receiving the same grades of ties as other lines, and as a result they are being placed in better condition than at any previous time in their history.

Conclusion

Although the tie situation is still complicated by wide differences of opinion many of these differences are being ironed out. The acute shortage of a few months ago is rapidly being relieved, and while the present high production may not possibly be maintained, it may confidently be expected that a sufficient number of ties will be secured to meet the ordinary needs of the roads for current maintenance and for such new work as may be undertaken this year, although deliveries will be delayed later in the season than usual. The placing in effect of standard specifications for ties, their inspection and treatment, is resulting to the mutual benefit of the producer and the user. The present specifications are a marked improvement and are producing a tie of superior quality.

While some of the actions of the Railroad Administration have been ill-advised and have resulted in unnecessarily disturbing the established methods of tie production, many of the innovations introduced will be of permanent benefit to the roads, and to the industry once they have become firmly established, and those in the field have an opportunity to adjust themselves thereto.

Fuel Association Convention a Big Success

Characterized by Large Attendance, Strong Addresses,
Timely Reports and Lively Discussions

THE FIRST SESSIONS of the eleventh annual convention of the International Railway Fuel Association were reported in the *Railway Age* of May 23, 1919, page 1249. A list of the exhibitors was also given on page 1283 of that number. This article covers an account of the proceedings for the closing sessions of the convention.

The following officers were elected at the last session: President, H. B. MacFarland, Atchison, Topeka & Santa Fe; vice-presidents, W. J. Bohan (Northern Pacific), J. B. Hurley (Wabash) and W. L. Robinson (Baltimore & Ohio Western Lines); executive committee, J. W. Hardy (U. S. R. R. Adm.), M. A. Daly (Northern Pacific), C. M. Butler (Atlantic Coast Line), L. J. Joffray (Illinois Central), C. C. Higgins (St. Louis-San Francisco), and J. M. Nicholson (Atchison, Topeka & Santa Fe).

Equated Tonnage and Its Relation to Fuel Consumption

By R. N. Begien

Federal Manager, Baltimore & Ohio Railroad, Western Lines

Equated tonnage has a certain relation to fuel consumption. However, this relation is established through the medium of the trainload. The fuel consumption per gross ton mile decreases as the trainload increases, provided the speed of the movement does not suffer to such an extent as to increase the time on the road materially. The purpose of equated tonnage is to secure uniform loading of power, regardless of the kind of equipment or number of cars involved. It is a well known fact that an empty car has a much higher resistance per ton of weight than a loaded car. For example, a 20-ton empty will show a resistance in the neighborhood of 8 lb. per ton of weight, or 160 lb. total resistance to traction on a level. On the other hand, a 70-ton car shows a resistance of approximately 4 lb. per ton of weight, or 280 lb. of resistance to traction on a level. These figures are approximate, but for practical use are correct. Of course many other features enter into the question, such as temperature, wind, rate of grade, curvature, type of car, etc.

In order to make practical standards which can be placed in the hands of yardmasters, it is necessary to use certain adjustments in building up trains, and to modify them as is necessary in the judgment of the chief train dispatcher to suit conditions under which the operation is conducted. If a locomotive is able to produce 30,000 pounds of effective tractive power behind the tender at rating speed, the train should have a combined resistance of 30,000 lb., irrespective of the character of the cars, and in order to accomplish this a certain arbitrary adjustment is added to the weight of each car, and the effect of this arbitrary adjustment is to automatically compensate the different weights of cars. This adjustment varies with the rate of grade, being about 15 tons per car on a .3 per cent grade, and about 2 tons per car on a 2½ per cent grade.

Building up a train tonnage, composed of the dead weights of cars, plus an adjustment, so that the combined resistance of the cars is equal to the effective tractive power behind the tender, give a tonnage which is known as an equated tonnage. The object is to secure uniformity of rating in order that the trains will always have a rated tonnage, irrespective of the kind of cars. There are a number of different ways of applying this principle, but unless some kind of equated

tonnage is used it is not possible to rate trains accurately.

It is safe to say that any road which has not used the equated tonnage system, and which has through freight to haul, has not built up its trainload to the best possible advantage. Full trainload at uniform speed spells efficiency in fuel consumption, and the relation of equated tonnage to fuel consumption is evidenced through the trainload.

Proper train loading contemplates each locomotive handling the maximum trainload which it can move on the ruling grade at the economic speed. At such speed the locomotive is working most efficiently. An increased speed, which may be brought about by reduced trainload, will result in inefficient locomotive performance, while a reduced speed, brought about by overloading, will produce the same result. With all trains moving at the economic speed, the locomotives operating at maximum effort and hauling the uniform trains under these conditions, the fuel consumption, when measured on the ton mileage basis, will be minimum.

Discussion

All who discussed the paper agreed with the statements made. Representatives of three roads talked to some extent on the problem and stated that adjustment in tonnage is successful and productive of excellent results.

Lame Engines and Their Effect on Fuel Consumption

By J. W. Hardy

Fuel Supervisor, United States Railroad Administration

The purpose of this paper is to show in a practical way how fuel is wasted by lame engines (engines with valves out of adjustment). With this end in view, tests were made on the Southern Pacific between Houston and Galveston.

The engines used were of the following dimensions: Engine 267 was of the 4-4-0 type, having a total weight of 137,425 lb.; weight on drivers of 91,675 lb., and tractive effort of 21,240 lb. The cylinders were 20 in. by 24 in.; the valves 12 in. diameter inside admission piston type; the valve motion was the Stephenson link, set as follows: Valve travel 6 in., 1⅛-in. lap, 3/32-in. exhaust clearance, line and line in front motion, and ⅝-in. lead in back motion. The engines were equipped with superheaters and burned fuel oil.

Engine 265 was of practically the same design and dimensions, with the exception that the cylinders were formerly equipped with slide valves, which were replaced with piston valves, simplified steam chests with 10 in. diameter valve outside admission, 1-in. lap, 1/32-in. lead in forward motion, 1/32-in. back, and 1/16-in. exhaust clearance.

The engines in these tests were run eight trips in each case with one exception, test No. 2. The test was conducted with engine 267, which had considerable lost motion in its valve gear, and had made 16,700 miles since last shopping. Engine 265 was in the best of condition, having been turned out of the shops after being generally overhauled and superheated. The same engineer and fireman were used throughout the entire test.

The tests made numbered from 1 to 6 inclusive—Test Nos. 1 to 3 with engine 267 and 4 to 6 with engine 265. There were many places where we could get the lame engine, but we could not get the other conditions, necessary to prove waste due to improper valve adjustment. We thought it was easier, better and more reliable to make changes on the

engine than to attempt to work out the other conditions, many of which we had no control over.

The objects of the tests were to determine the fuel wasted by locomotives with valves out of adjustment (lame engines), and to see how lame a locomotive could be without loss of time or complaint on its condition. Where an engine is so lame it cannot make time or handle its tonnage, it immediately attracts the attention of the transportation department and is taken in and repaired. It is only in rare cases that engines go lame all at once. When this occurs, there is usually something lost, slipped or broken. This is noticed at once and is taken care of at the earliest possible moment; but, where the change takes place slowly and gradually, as it does by age and wear, we become more and more accustomed to it, and it is allowed to go on day after day and week after week wasting fuel all the time.

An oil burner was selected because a more accurate check could be made of the fuel used than with the coal burner. Measurements were taken just before starting, and on arrival, so that oil and water used represents what was actually used in pulling the train and making station stops. All conditions of engines and service were kept as near the same as possible, except the valve adjustment, which is shown at the heading of each test made.

There was a total of 5/16 in. lost motion in the valve gear of engine 267, but this was pretty well distributed, the engine not lame enough in any case to affect the schedule of the train. There was a noticeable kick in the engine when lame that was not there when squared.

With the slight change in valve adjustment shown between tests 1 and 3, there was a difference of 18.33 per cent in the fuel consumed; no other change can be made of this loss of fuel than to the condition of valves. The waste would undoubtedly increase with heavier service or more distorted valve condition, this is proved by test No. 6 with engine 265. Test No. 2 is not recorded for the purpose of comparison, but to show the condition of valves after the engine was squared up by the travel at full stroke and pronounced O. K. More throttle had to be used with the engine in this condition than when the valves were as in Test No. 3.

The valves govern the application of the power of steam to the locomotive and are of great importance to fuel consumption. It takes fuel to generate power, and it means a waste of fuel if this power is improperly used in the cylinders of our locomotives. The exhaust action is different when the engine is lame, causing a pulsating draft instead of a regular and constant pull on the fire. This wastes fuel in addition to the improper application of the power to the machine. Square engines steam better than lame ones, although these engines steamed well in both cases.

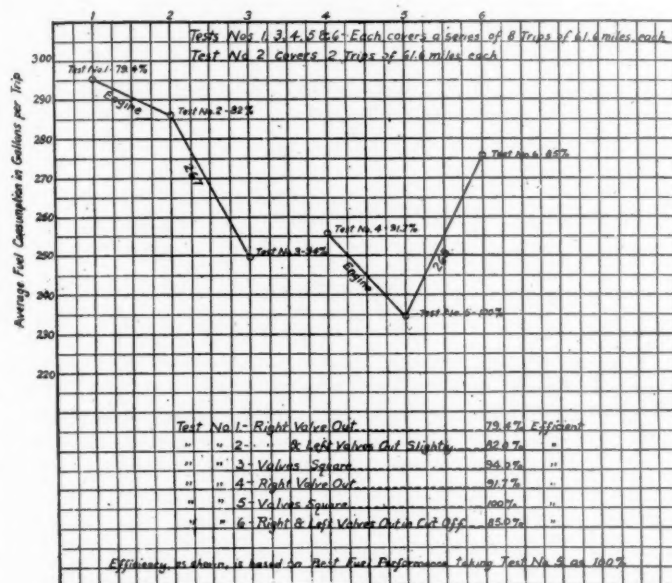
Valves out of square in a measure take the economical operation of the locomotive out of the hands of the crew. Their hands are practically tied because they are robbed of the control of the power applied to the locomotive in their charge. With an indifferent crew this loss will increase.

There is no way that we know of where we can get as good returns, and get them as quickly and at as little cost, as by squaring valves. It only costs a few dollars more to do this work well; it only costs a few dollars to do it at a time when it is needed and should be done, and it will often begin to pay dividends the first trip after it is done. Transportation people should want it done because the engine will pull more and pull out less draw bars when square than when lame, because the power is more evenly distributed in the cylinders and helps to prevent lunging and jerking when starting. The mechanical department people should do it because it cuts down fuel waste and the cost of locomotive maintenance. The crew should want it done because it makes their work easier and more pleasant.

There is liable to be less complaint on a lame oil burner, especially if she steams, than on a coal burner on account

of less manual labor to fire the oil burner. Why spend money for brick arches, superheaters, etc., and then waste as much with valves out as we can save with both of them? Why spend money to generate steam and then not control its use? You can go to any union station or large freight yard and hear engines pulling out every day on long, hard and heavy runs that sound worse than either of these engines did. The question of proper valve adjustment is so important that it should be specialized on.

The cut-off and steam distribution on test No. 2 with engine 267 merits careful study. This engine was run over at full stroke; in fact, was more carefully gone over than this work is usually done; pronounced O. K., and, no doubt, under ordinary circumstances, would have run possibly for months in this condition. But note how much better this



Relation of Fuel Consumption to Valve Setting

engine did in Test No. 3 with valves properly adjusted and a little of the lost motion taken up.

The difference in the performance of engine 267 with valves lame and square was so much we decided to make a test with an engine having as little lost motion in the valve gear as possible. We therefore arranged for a test with engine 265. This engine was new, and when broken in the right go ahead blade was changed so the cut-off was as shown in test No. 4. This engine was quite lame only on one side, and this low down in the quadrant, and, as the lever was hooked up, it got better. As the engine did most of its work at close cut-off, this change only made a difference of about 9 1/4 per cent in the fuel used, but the engine had a very disagreeable kick on the right side when run at high speed and short cut-off.

Certain kinds of lameness are more wasteful than other kinds. The engine that is lame where it uses the most of its steam is the most wasteful. This is clearly brought out by test No. 6 with engine 265 which was made lame in the cut-off where it did most of its work by changing the back motion blades so the engine cut-off in the forward motion as shown above test No. 6.

In all tests where the engines were lame, the lameness was aggravated by its being more difficult to keep the valves lubricated, and both engines rode much harder while lame than when squared. An engine can sound square and still have valves improperly set. A condition of this kind can only be discovered by careful measurements.

My conclusions from these tests are that a waste of as much as 25 per cent of the fuel could be made by further

distortion of valves before the engines would begin to lose time or affect the train service.

VALVE SETTING AND FUEL CONSUMPTION FOR TESTS NOS. 1 TO 6 INCLUSIVE, WITH CUT-OFF AT 6 INCH PISTON TRAVEL

Test No. 1, Engine No. 267. Right valve out—cut-off—right side, front $5\frac{1}{2}$ in., back $10\frac{1}{2}$ in. Left side, front $7\frac{1}{4}$ in., back $7\frac{3}{4}$ in.
 Test No. 2, Engine No. 267. Both valves out—cut-off—right side, front $7\frac{1}{2}$ in., back $5\frac{1}{2}$ in. Left side, front $7\frac{1}{2}$ in., back $5\frac{1}{2}$ in.
 Test No. 3, Engine No. 267. Both valves square.
 Test No. 4, Engine No. 265. Right valve out—cut-off—right side, front $8\frac{1}{2}$ in., back $3\frac{1}{2}$ in. Left side, front $6\frac{1}{2}$ in., back $6\frac{1}{2}$ in.
 Test No. 5, Engine No. 265. Both valves square.
 Test No. 6, Engine No. 265. Both valves out—cut-off—right side, front $5\frac{1}{2}$ in., back $8\frac{1}{2}$ in. Left side, front $4\frac{1}{2}$ in., back $7\frac{1}{2}$ in.
 Per cent increase in fuel consumption Test No. 1—18.33 per cent.
 Per cent increase in fuel consumption Test No. 2—14.63 per cent.
 Per cent efficiency of engine in Test No. 1, considering engine in Test No. 3 as 100 per cent—84.5 per cent.
 Per cent efficiency of engine in Test No. 2, considering engine in Test No. 3 as 100 per cent—87.25 per cent.
 Per cent increase in fuel consumption Test No. 4—9.12 per cent.
 Per cent increase in fuel consumption Test No. 6—17.70 per cent.
 Per cent efficiency of engine in Test No. 4, considering engine in Test No. 5 as 100 per cent—91.6 per cent.
 Per cent efficiency of engine in Test No. 6, considering engine in Test No. 6 as 100 per cent—84.9 per cent.

Discussion

Discussion brought out the fact that considerable saving in fuel could be made by proper setting and squaring of valves so that the maximum energy delivered by the steam could be given up at the proper time. One speaker expressed surprise that mechanical engineers have not paid more attention to the proper setting of valves and stated that the defect was a comparatively easy one to correct. He also stated that in many shops not enough attention had been paid to the qualification of the men who adjust the valves. Another speaker brought out the point in regard to lubrication that it is not the question of quantity of oil but of regular and uniform distribution. The same speaker advocated the use of indicators, but Mr. Hardy, in his closing remarks, pointed out that the use of indicators was not practical since so few knew how to apply the principle. He thought the use of standard trams for setting valves instead of indicators would be found more in line with practical methods.

Russian Method of Testing Locomotives

The methods of testing locomotives used on Russian railways was described in detail by G. E. Ledegeff, assistant chief of locomotive department, Russian Mission of Ways of Communication. The first locomotive testing laboratory of the world was installed at Kieff in 1882. During the next year the first attempts were made to determine the performance by establishing constant condition in actual service. This method has been developed to a high degree in Russia. It is now possible by means of road tests to draw up terms showing the tractive effort, steam consumption and the efficiency of the boiler and machinery for various conditions of speed, throttle opening and cut-off.

Storage of Coal by Railroads During 1918

By H. H. Stoeck

Professor of Mining Engineering, University of Illinois

About two years ago the writer sent out a questionnaire to several hundred parties storing coal in quantities varying from a few tons stored in the ordinary house cellar to hundreds of thousands of tons as stored on the docks along the Great Lakes and by some of the large industrial concerns. The replies to this questionnaire were studied and a tentative set of conclusions drawn up, and sent to the parties who had answered the original questionnaire, with the request that they be thoroughly criticized. As a result of these criticisms, a revised set of conclusions was drawn up and published in Circular 6 of the Engineering Experiment Station of the University of Illinois, together with all of the data upon which the conclusions were based.

Realizing that during the period of the war the conditions

under which coal was stored were unusual, because of the pooling of coal and because the coal furnished was dirtier and less carefully sized than under normal conditions, another questionnaire was sent out during the fall of 1918 to practically the same list of persons as the previous one, asking for the experiences of those who had stored coal during the year 1918 and for a criticism of the conclusions published in Circular 6. A similar questionnaire was sent to a large number of power plants in the State of Illinois, and a large number of fires in coal piles were studied during the summer and fall of 1918. In these several studies, railroad storage was only one of the problems included and furthermore, the study had particular reference to Illinois and Middle West coals.

On March 11 a conference was held in Chicago at which the general subject of railroad storage was discussed and the general conclusions in Circular 6 were endorsed. Each one was asked to furnish the writer his own conclusions upon railroad storage and copies of all instructions issued by railroads in his territory to be studied and summarized by a sub-committee consisting of Messrs. McAuliffe, Roesch, Collett, Hardy and the writer, at a meeting held in Urbana, March 25. At that meeting certain general conclusions were drawn up as representing what in the opinion of the committee represents safe practice at the present time and these preliminary conclusions were issued by Mr. McAuliffe in a circular addressed to the railroads of the country as a guide to them in storing coal during the spring and summer of 1919.

Why Should Railroads Store Coal?—The insurance feature of coal storage is so self-evident as not to need discussion, and the equalization of equipment throughout the year has been fully discussed in the reports of the several coal storage committees. (See also Railway Administration circular.)

Coal stored in summer costs less to transport than would the same amount hauled during the winter. By relieving the railroads of transporting so much coal during the season of peak load and high transportation cost, general freight traffic is helped.

Other reasons for storing coal by the producer or by the consumer need not be considered here, as the railroad is a transporting agent and not a producer of raw products or a consumer of finished products, excepting for its own needs.

The railroads are also interested in the storage of coal, because they are the largest users of it, using more than 25 per cent of the total output for their own uses, and since the transportation of the coal output forms about 34 per cent of the freight carried by the railroads of the United States, the railroads should, therefore, not only protect their own interests by storing coal, but should encourage both the mine operators and consumers to store coal so as to help stabilize the coal industry in order that it can be conducted more nearly up to its full time efficiency and thus decrease the present excessive but absolutely necessary overhead charge due to the fact that the miners of the country work only about 200 days per year.

Suggestions Regarding Storage of Coal by Railroads.—The replies to the questionnaire sent out in 1918 asking for experiences in storing coal during 1918 and for a criticism of the conclusions published in Circular 6, show that the experience of the past year has confirmed these conclusions in very great part.

(The conclusions included detailed instructions regarding the storage of coal as regards location of piles, season when coal should be stored, kinds and sizes which may be safely stored, methods of piling, ventilation and precautions to be taken to avoid spontaneous combustion.)

Summarizing these suggestions:

Each railroad should study its own storage problem in great detail. Get ready to store before it is time to begin

the actual storing by outlining a definite policy far enough in advance so that every one who will have to do with the storing can receive *definite* instructions, not merely suggestions. Then when storing begins, see that the instructions are carried out to the letter. Many failures have been due not to faulty instructions from the head office, but to the fact that they have not been followed.

When it is time to store, prepare a place carefully. Do not wait until the coal to be stored is on the track and then dump it anywhere to get it out of the cars. Specify the kind of coal that is to be stored and see that the specifications are carried out by having an inspector at each storage pile who is competent not only to inspect the coal furnished and reject it if not according to specifications, but who has authority to see that the storage instructions are carried out to the letter.

Prepare definite instructions as to the sizes of piles for different coals and for the different kinds of storage appliances that may be available.

Watch the stored coal carefully for any evidence of heating and if the temperature rises sufficiently, begin to move it in time. See that adequate machinery for handling the coal is available and always in condition to be used. Do not store coal unless you are prepared to do it properly and to watch it thoroughly after it has been placed in storage.

Attention to these details will very largely prevent heating of coal or if heating occurs will prevent a loss of coal from dangerous fires.

It should be understood that each coal storage is a distinct proposition, and while it is believed that the suggestions in this paper will be helpful to any one wishing to store coal, they are suggestions and guides only, based upon the experience of those who have stored coal. They are not absolute facts and subsequent experience may show changes to be advisable.

Effect of Storage Upon the Properties of Coal.—The heating value of coal as expressed in B. t. u. has been shown by experiments of the United States Bureau of Mines and by Professor S. W. Parr of the University of Illinois, to be very little decreased by storage. It must be admitted, however, that the opinion is very wide-spread that storage coal burns less freely than fresh coal. This opinion is by no means universal amongst railroad men, for in the latter pages of this paper giving the opinion of railroad men storing coal, it is distinctly stated by some that the storage coal burns better than the fresh coal.

Experiments at the University of Illinois have indicated that coal that has been in storage can be burned as readily as fresh coal if a thinner bed is kept on the grate and the draft properly regulated. This, of course, applies particularly to stationary plants as draft cannot be as well regulated in locomotive practice.

Insurance Adjustments.—An attempt has been made to obtain information regarding the adjustment of insurance in connection with the storage of coal but very incomplete information had been received at the time of writing. It is suggested that this subject is worthy of much more careful and extended study, possibly by a subcommittee of the Fuel Association.

Storage Systems

Choice of a Storage System.—In the choice of a storage system, the following points should be considered:

- (1) The location, size, and topography of the available storage ground.
- (2) The capacity of the desired installation, that is, the amount of coal which it is desired to load and unload in a given time.
- (3) The cost of the plant.
- (4) The cost of maintenance.
- (5) The cost of operation.

(6) The amount of breakage to be permitted in handling the coal.

(7) The way in which the coal is received, in open or box cars, or in boats.

(8) The length of time the coal must be kept in storage.

(9) Climate: A dry climate with cold nights such as is found in Colorado, for instance, may give different conditions than will be found in Illinois, where there is a great deal of moisture in the air and the summer nights are almost as hot as the days.

The requirements of an ideal plant are:

(1) Adequate ground area, so that different kinds of coal may be stored separately if necessary.

(2) Adequate facilities for rapidly and economically transferring coal from cars or from boats into storage.

(3) Adequate facilities for rapidly and economically reclaiming the coal and for rapidly moving any part of the pile which shows evidences of taking fire.

(4) Adequate track facilities, with gravity facilities, if possible, for handling cars.

(5) Means for preventing undue breakage in handling.

(6) Adequate available water supply.

(7) Low cost of installation, maintenance, and operation per ton of capacity. A storage plant is in operation very irregularly and costs are likely to be correspondingly higher because of the heavy fixed charges, especially interest and depreciation.

(The paper gave detailed analyses of the advantages and disadvantages of methods of storage particularly applicable to railroad conditions. Replies to questionnaires summarizing the current practice and opinion regarding railway storage were also included.)

Discussion

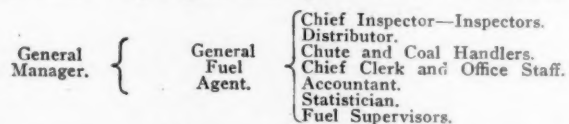
The discussion hinged largely on bituminous coal storage fires. Several pointed out that such fires may occur to any kind of coal when stored under different conditions, but to aid in preventing fire proper preparation should be made for storage facilities. Dry high ground, if possible, should be chosen and clean even grade coal should be stored in the same pile. Dust veins should not be permitted. Different kinds of coal should not be mixed and use of water in small quantity was discouraged.

Fuel Department Organization

By T. Duff Smith

Fuel Agent, Grand Trunk Pacific

When one stops to consider the enormous amount of money spent by the railroads of the United States and Canada for fuel, it does seem strange that every road has not a fuel department. I will speak only of an up-to-date fuel department, and the duties and qualifications of its staff. I do not expect you all to agree with me, especially in many of the details, and trust that a full and frank discussion will enable the association to formulate a standard fuel organization which it can recommend for adoption on all roads. My organization plan would be as follows:



You will note the order in which I have taken them—from the production to final usage.

Taking them in the order shown on chart:

General Manager.—As the general manager is responsible for the economical operation of the road, I take it for granted that he is the one who is most interested in fuel economy, and therefore the general fuel agent should report direct to him.

General Fuel Agent.—The general fuel agent should be responsible for the purchase, distribution and accounting for all fuel. He should have a thorough knowledge of all fuels on his own line, and adjacent thereto, also keeping in touch with all new development, and in these days of labor unrest, he should keep well informed of the situation so that on any indications of approaching trouble causing closing of the mines, he will have sufficient stock on hand to protect his road. He should be familiar with the characteristics of the various coals, such as slacks, lignites, etc., by the use of which great economies can be made in fuel used in roundhouse plants, stations, tanks, etc.

He should have a knowledge of the various systems of handling and storing coals, so as to meet any contingency that may arise, and keep his actual handling costs to minimum. He should keep a close watch on his supplies and stocks protecting against any possible shortage by reason of unforeseen delays, wrecks, washouts, strikes, etc., at the same time being careful not to carry too heavy a stock in cars, thus causing extra cost by shrinkage, extra handling and interest on idle money.

The general fuel agent should purchase all fuel, under the direction of the general manager, after consultation with the superintendent of motive power, as to the merits and economic aspects of fuel required for various purposes. This I take to be very necessary on account of the multiplicity of designs of locomotives and boiler plants. We all know that a coal which proves economical on one type of locomotive or boiler is the very opposite on another type, yet we have to supply fuel for them all.

He should keep in touch with general superintendents, so that they may facilitate movement of cars, both loaded and empty, and also get advance notice of any extra supplies required on account of rushes of traffic, opening ballast pits, etc. He must also consult with them as to any permanent or temporary alterations required at coaling plants, especially when arranging to dump storage coal.

He should especially consult with the superintendent of motive power, as this is the department using by far the larger proportion of our fuel, and it is only by close co-operation of these two departments that we can make our best results in economy. On most roads we also have to rely on the motive power department to make all our tests, as we are not all in a position to maintain an organized testing department with all the necessary equipment. Where a performance sheet is compiled, it will not be possible to get any improvement in results unless these two departments are working closely together.

The general fuel agent should not spend too much time in his office, as all routine work there can be taken care of by his clerical staff. He should be out on the line as much as possible, getting in close touch with coal operators, his inspectors, master mechanics, in fact with every one who is at all interested in fuel, and thus gain information which will enable him to inaugurate new methods, thus making economies.

Inspectors.—As we cannot use the coal unless it is properly produced, the next to deal with are the inspectors. As I have often stated, I prefer practical miners for these positions. A practical miner, after a little outside training, is able to judge as to whether the coal is up to the proper standard of the mine, and in cases where coal is being tendered for loading which is not up to standard, is able to detect the cause of the trouble and apply a remedy.

The inspector's duties are principally to inspect the coal as delivered, but he also sees that cars are clean and in fit condition for loading, inspects the weighing and notes any differences between actual and marked tare. He should also report daily the number of cars of company coal loaded with destination, and the number of cars of commercial coal

loaded, and should send a weekly report of local conditions at the mine.

Distributor.—After receiving the coal at the mine, it is necessary to properly distribute it, which is done by the fuel distributor. His title implies his work, and he must watch daily stocks on hand and in transit closely so as not to overstock or run short, also so as to get his coal carried without causing any holding back of revenue traffic on account of requiring coal rushed to any particular point.

Chute and Coal Handlers.—Having the coal at destination it is necessary to get it on locomotives or in boiler rooms by means of coal chutes or handling in some other economical manner. These are so closely connected with fuel costs that the handling of all fuel should be taken care of by the general fuel agent, either by contractor or men on the fuel payroll. By this means he has a constant and efficient check on the cost of this work.

Chief Clerk and Office Staff.—The office routine and records are taken care of by the chief clerk and staff and this does not require any explanation.

Accountant.—The accountant is responsible for passing all invoices and vouchers, making all charges of fuel issues and keeping the fuel stocks account.

Statistician.—The statistician's chief work is in compiling performance records, and any other similar reports required. I find myself unable to compile any coal performance reports from the fact that we have no means of obtaining accurate data as to the amount of coal supplied to any particular engine. It is all guesswork, so that to attempt to compile any comparative report of performance would be ridiculous and only a waste of time. I hope that the day is not far distant when every coal chute will be equipped with an automatic device, either weighing or measuring, so that we may know the exact amount of coal taken by each engine, but until such is installed I feel that all our efforts at comparisons are of no avail.

Fuel Supervisors.—The coal now having been mined, distributed and placed on the engines, the fuel supervisor comes in, and by his skill and training as an engineman develops the highest training and practice possible in his engineers and firemen, always looking to the little things that count so much and taking for his text "The most 100 ton miles for the lowest actual cost."

Such, in my opinion, is the complete organization of a fuel department, and such an organization with the motto "Service and Co-operation," with everybody living up to it, could make great savings for any road.

Co-operative Research and the Railway Fuel Problem

By Captain O. S. Beyer, Jr., U. S. A.

The influence of such fundamental items of railway operating expense as the cost of fuel and labor on the direction of developments, both mechanical and economical, in the industry has always struck me as a most important subject for consideration. When practices of locomotive and car construction or train operation of America are compared with those of Europe, striking differences are revealed. Intensive studies of the effect of basic cost items indicate more clearly than anything else the reasons why, for instance, the superheater, the mechanical stoker, the brick arch, the feed water heater, as well as the composite modern types of American locomotives themselves, assume tendencies in this country differing quite markedly from analogous tendencies in other countries. In fact, I do not think it an exaggeration to say that the whole course of American railway development is greatly influenced by the cost of fuel and labor. The problems created by the railway labor and fuel situa-

tion have a large economic background, which is very fundamental in its relation to the whole transportation industry. An analysis of this phase of the problem is a big subject in itself and cannot be elaborated here. Certain elements of the problem, however, are amenable to certain forms of solution which are becoming more and more important. Briefly, these particular solutions may be characterized as possible methods for increasing the productivity of the agencies creating the operating cost in question. To increase, as it were, the yield of fuel, to get more out of every pound, to utilize it more efficiently, is of more importance today than it ever was, and will become more and more so as each increment added to its cost places an additional premium on its efficient use.

The time has come, in my estimation, to survey the railway fuel situation, its problems and possibilities, with a thoroughness never attempted before. This association has succeeded, after several years of strenuous effort, in effecting a co-operation between many interests, whereby a piece of fuel research was accomplished which undoubtedly some day will be considered the inception of a movement contributing most extensively to the solution of the present-day railway fuel problem.

Since the committee on Fuel Tests handed in its report on the Test of Six Grades of Coal from a Franklin County, Illinois, Mine, at the 1917 convention, much has transpired. We have come to realize, as never before, the true significance of the scientific method in the solution of the problems in our industries, as compared with the slow, dull, expensive practices of cut and try, rule-of-thumb, or by whatever other term the awkwardness of much of the industrial progress of the past might be characterized. Perhaps no other event of international importance than the war for democracy has served to emphasize this so well. A new realization has developed among scientists, engineers, administrators, statesmen, concerning the value of the *scientific method* in the solution of industrial problems.

It is my intention to point out as far as this association is concerned that its greatest opportunity lies in the direction of continuing and developing as rapidly as possible the lead it took when, through its Committee on Fuel Tests, it brought together the many interests and secured the necessary funds which eventually made possible the report already mentioned. This was but a beginning and a beginning under most adverse circumstances.

As all this is indicative of what co-operation in research really means, the question which arises is, what can be done in this direction on behalf of contributing to the solution of the railway fuel problem? The Fuel Conservation Section of the United States Railroad Administration thoroughly appreciates the activities of this association. The extensive fuel and locomotive test facilities, but so meagerly used, at the Illinois, Iowa and Purdue experiment stations need but to be referred to. It seems, therefore, that the whole question reduces itself to one of initiative with the International Railway Fuel Association.

All these remarks would perhaps have little appeal were there not many important railway fuel problems pressing for solution. Consequently, in support of the remarks I have made above, the following fuel investigations, which can only be carried on in a sufficiently comprehensive way by co-operative research, are submitted for consideration by way of conclusion:

(a) *The Chemistry of Combustion.*—The theory of combustion as it exists today, applied to the burning of locomotive fuel, is incomplete, and fails to explain the occurrence of some very important phenomena, especially with reference to fires of varying thicknesses, clinkering, coking, the nature of the higher hydrocarbon products of combustion, etc.

(b) *Firing Practices.*—The purpose of this should be to

determine the most economical combination of practice, devices and kinds of fuel in different territories possible. Maximum boiler capacities resulting from these combinations as well as relative smoke production should be determined.

(c) *Heat Absorption.*—A detailed experimental, as well as mathematical study of the process of heat transfer in the locomotive boiler should be made, especially with reference to the distribution of the heating surfaces between tubes, flues, combustion chamber and firebox.

(d) *Chemical and Physical Nature of Exhaust Gases.*—A splendid opportunity exists to investigate the products of combustion as they appear in the locomotive front end after they have done their work. The results might go a long way towards explaining the mysterious "unaccounted for" losses in the heat balance.

(e) *Accurate Smoke Measuring and Indicating Devices.*—Jointly with the foregoing investigation, attempts should be made to develop accurate smoke measuring and indicating devices.

(f) *The Drafting System.*—An investigation of the entire drafting system of the modern locomotive cannot be made too soon. The proportioning of ash pan opening, grate opening, gas areas between the end of the arch and the door sheet, of flues, tubes, and superheater damper, the space under the smoke box diaphragm, and the smokestack should all be carefully determined and general values for them expressed in empirical formulae having a wide range of application. This is far from accomplished today.

(g) *The Law of Resistance to Flow of Gases.*—Detailed study of the flow of gases through the locomotive boiler reveal possibilities for reducing their resistance to flow and perhaps at the same time suggest ways for effecting greater interchange of heat between these gases and the heating surfaces.

(h) *Radiation Losses.*—Very little is known about this important item, and in consequence losses resulting therefrom are thrown in with those considered as "unaccounted for." It is entirely possible to develop data on this point, especially with the perfected methods of pyrometry now in existence.

(i) *Locomotive Feed Water Heating.*—After a long period of development, the locomotive feed water heater is at last becoming available. As it stands today, it is perhaps one of the finest examples of the results of scientific experimentation applied to the solution of locomotive problems. The good work, however, should not stop. As long as feed water can be heated to still higher temperatures, as long as there are heat units still going up the stack which might be saved, the feed water heater investigation should continue.

(j) *Locomotive Boiler Performance.*—The whole general subject of locomotive boiler performance needs more study. Unfortunately the available reliable test data covering a sufficient range of performance is entirely too limited for this purpose. Consequently little opportunity exists for developing an extensive and well founded theory for locomotive boiler design.

(k) *Further Study of the Superheater.*—The superheater deserves further investigation. The work done at Purdue and especially at Altoona with varying lengths and diameters of superheater units has certainly contributed most valuable knowledge on this subject. As a continuation of this work the correlation between degree of superheat and boiler pressure as reflected in the steam economy of the engine should be worked out over wider ranges and mathematical determinations verified. Another very important question coming within this field is the effect of varying degrees of moisture in the steam entering the superheater.

(l) *Fuel.*—Investigation concerning fuel should primarily contemplate securing data on the relative steaming values of the fuel used in the railway service as determined

from a complete series of boiler performances as well as maximum evaporative capacity tests. The data should also include information on the spark and smoke production of the various coals and their clinkering and honeycombing qualities, in order, if possible, to tie up practical performances of coals with the characteristics indicated by proximate and ultimate analyses and other laboratory tests of selected samples. The fuels which should thus be investigated are: (1) Typical coals from all important mining districts. (2) Various commercial sized and some specially sized coals. (3) Land stored, water stored and freshly mined coals. (4) Powdered bituminous, anthracite, lignite and peat, together with combinations thereof. (5) Oil, lignite, anthracite and bituminous coals, coke, peat, briquets and possible mixtures of these fuels.

Complete information as outlined would enable the railroads more clearly to specify desirable and necessary characteristics of fuel and to select fuels with far more intelligence than can now be done. It would enable them to determine with much greater accuracy the actual value of the various fuels available instead of solving this vital question by the unscientific methods now employed of "collective bargaining" between coal salesmen and fuel or purchasing agents. Some tests have been made to determine the relative steaming value of and the maximum capacity obtainable from certain typical locomotive coals and a limited number of different sized coals. One railroad, which has developed this data for coal used on its lines, has effected economies which have paid in one year over tenfold the cost of making the experiments.

It is entirely possible mechanically to prepare fuel in a highly pulverized form and burn it in a locomotive furnace. The machinery for doing this has been developed and used with success. The next logical step is to determine accurately just what is the complete economic value of the utilization of pulverized fuel. The many general advantages which are bound to follow its use are, of course, recognized, but it is not known how much, for instance, the evaporation per pound of coal is increased at different rates of combustion. The heat balances over the complete range of boiler capacities of a few typical boilers fired with pulverized fuel have yet to be compared with the balances of these same boilers fired with ordinary fuel. And lastly, values as exactly as possible of the increase in capacity of the pulverized fuel fired boiler should be established. It is not yet possible completely and finally to judge the wisdom of either attempting to perfect or of widely introducing this system of combustion.

Discussion

S. C. R. Richards, director Engineering Experiment Station, University of Illinois, told of investigations conducted by that institution. The scope of the work is limited because of lack of funds. He hoped arrangements could be made to secure co-operation from railroads in carrying on work. J. M. Anthony spoke of the need for a scientific investigation to determine proper proportions of locomotive boilers, the design of which had been along empirical lines. W. J. Bohan advocated the formation of a committee representing the railroads to co-operate with universities in research work.

Front Ends, Grates and Ash Pans

During the past few years much attention has been given to results obtained from the performance of heavy Mikado and Santa Fe type locomotives. The committee felt that an analysis of some of the apparatus pertaining to the designs of front ends, grates and ash pans was pertinent, and accordingly sent a letter to the mechanical engineers of some of the larger railroads of the country, reading in part as follows:

"In connection with work by the Standing Committee on

Front Ends, Grates and Ash Pans of the International Railway Fuel Association, we wish to compile data in regard to improvements in designs of front ends, grates and ash pans which some of the more important railroads have found to produce a saving in fuel. We would like to have this data in connection with the larger type locomotives, preferably the Santa Fe or the Mikado types.

"If your railroad has found a change in design within the last two or three years which is proving to be a more economical design than you originally had on front end arrangements, on grates or on ash pans, also if the designs you now use are giving very good economy, will you please send drawings showing the old and new designs and also advise as to the size of the locomotive, the class of service, the grade of fuel burned and any further information which you see fit to give regarding both old and new designs."

The response to these letters, together with information submitted by individual committeemen, has suggested a comparison of present practice with the practice of some fifteen years ago, particularly in reference to front end design when the Master Mechanics' Association in 1906 endorsed the Purdue University tests on front ends.

Front Ends:

The fundamental principle of the Master Mechanics' standard front end is that the height, H , of the portion of the stack extending above the smoke box and the distance, h , that the exhaust nozzle is below the horizontal center line of the smoke box be, for best results, as great as practicable. This being done, dimensions of certain importance are ascertained in accordance with the following formulae in which D is the diameter of the smoke box, P the distance the stack extends below the top of the smoke box, d the diameter at the choke of the stack, b the diameter of the base of the stack, and h the distance from the base of the stack to the choke or smallest dimension of the stack.

$$\begin{aligned} d &= .21D + .16h \\ b &= 2d \text{ or } .5D \\ P &= .32D \\ p &= .22D \end{aligned}$$

It is to be remembered that the diameter of the smoke box on which tests were made in establishing the design factors for the standard front end was 74 inches, and that the maximum back pressure of the exhaust blast that produced the draft on this oil burning locomotive was only a little more than 4 pounds. These are conditions which do not prevail in general practice today. The diameter of the smoke box on the majority of larger engines is from 80 to 91 inches, and the back pressure is, far in excess of a maximum of $4\frac{1}{2}$ pounds.

The function of the stack is a very important one in its relations to the drafting of the locomotive and its fuel economy. The diameter at the choke of the stack, as determined by the standard formula, is made a function of the diameter of the smoke box, as well as the distance of the exhaust nozzle below the center line of the smoke box. The question arises whether or not this is a proper basis of design with present-day practice with large locomotives, either using saturated or superheated steam, hand fired or stoker fired. Is this the proper equation to give maximum fuel economy? Does it give a stack that is large enough to take care of the exhaust steam and the exhaust gases and to deliver them properly and with such a degree of freedom that good fuel economy results?

By comparing the formulae with the practice on present prominent railroads, we find that the maximum calculated diameter of the stack at the choke is 23 inches and that the actual diameter is 21 inches. In this case the minimum area of the actual stack is 17 per cent below that required by the formula; no data have been established by experiment on this coal-burning Santa Fe type superheater locomotive

to show that a 23-inch or larger stack might not be used.

This railroad in question is notably a leader in the large size of its stacks. Another railroad in an adjacent territory is using a 17-inch stack on this same type of locomotive.

An analysis of all the design dimensions referred to by the formulae is of great interest as a matter of comparison, and one might possibly draw the conclusion that the dimensions were made to suit other conditions and not made to follow the formulae in that they vary as much as 100 per cent in several instances.

What then is the state of the standard master mechanics' front end? It may possibly be expressed in the words of a prominent mechanical engineer when he said recently: "So far as present large power is concerned, there is no such thing as a standard master mechanic front end. On present-day power, using superheater steam, the arrangement will not permit such a front end."

The master mechanics' front end did not provide a front end netting which is common to most locomotives of today, so located as to extend from the table plate at an angle of about 40 degrees to the forward part of the smoke box. This location of the netting for interception of the exhaust gases makes accessibility of the front end rather difficult, and many designers have expended their efforts in developing a different arrangement of the netting or spark arrester.

The Chicago & North Western has had for several years a box arrangement known as the Slater front end which is claimed to give very satisfactory results. The Burlington has an arrangement differing widely from that of other railroads so far as form is concerned, having a basket form over the exhaust pot. The Rock Island has a cylindrical spark arrester. (See *Railway Age* December 6, 1918, page 993).

This road reports that it has several hundred locomotives fitted with this device, with the most gratifying results.

With these variations of designs of front ends the question arises with this committee as to what should be endorsed as the best form of arrangement of a standard front end and what should be the basis of design of the stack under present-day conditions. At this time the committee is unable to make recommendations.

Grates:

In studying the grates in use on large locomotives, we find that they are for the most part of the finger type, and are divided into four sections. During the past few years power shakers have been introduced on a considerable number of the larger locomotives. In such case the arrangement is such that the grates can be shaken either by power or by hand, and, of course, in a very much shorter time than by the former method.

There is a tendency on the part of several railroads to change from the finger type grates to the table type. Tests recently made on one road show a decided saving in fuel due to the change from the finger to the table grates.

Ash Pans:

The general design of ash pans must necessarily be adapted to the particular class of locomotives, some locomotives permitting a different arrangement than others. In general it would appear that the ash pan is designed to fill a space that has been left over after other parts of the locomotive have been utilized to the best advantage. So far as the type of hopper is concerned, it seems that the duplex hopper type is in most general use, although there are a considerable number of multiple hopper type ash pans in service.

In general the ash pan doors open so as to dump the ashes towards the back end, although on a few railroads the two doors open, the one towards the front and the other towards the back of the locomotive.

In many instances the mechanical engineers are not co-ordinate in their actions; the designs that are satisfactory

on one railroad are sometimes discontinued on another. This is particularly true with reference to the sliding versus the hinged door.

The report was signed by H. B. MacFarland (A. T. & S. F.), Chairman; W. J. Bohan (N. P.), E. B. DeVilbiss (Penn. Lines), J. P. Neff (Am. Arch Co.), and Frank Zeleny (C. B. & Q.).

The Effect of Reducing Exhaust Nozzles to Overcome Front End Air Leaks

By F. P. Roesch

Supervisor, Fuel Conservation Section, Northwestern Region

The manager of the Fuel Conservation Section, United States Railroad Administration, under date of August 1, 1918, sent out Fuel Conservation Circular No. 8, addressed to all motive power officials concerned with locomotive maintenance. The circular called particular attention to the prevalence of air leaks around the outside steam pipes on superheated steam locomotives at the point where these pipes enter the smoke arch, and advised how these leaks could be detected by means of an ordinary torch test.

While in some instances the recommendations embodied in circular No. 8 were fully complied with, in other cases it was found that proper measures were not used, due, no doubt, to the fact that those interested in the maintenance of the locomotives did not realize the importance of the proposition.

The usual methods pursued in taking care of the air leaks around these steam pipes was to pack the opening between the pipe and gland with fibrous asbestos packing, either rope asbestos or plaster being used. Tests have proven that through the action of the exhaust this packing is gradually pulled into the front end, eventually leaving a clear opening. Where all of the packing in this manner becomes so pulled out, it leaves a combined opening around the two steam pipes in the average construction, equal to an orifice $8\frac{1}{2}$ in. in diameter.

These air leaks, of course, do not occur suddenly, consequently the effect on the draft is gradual, and this in turn gradually reduces the steaming qualities of the locomotive. It is because locomotives gradually fail for steam that nozzle bushing is eventually resorted to, as did the steam failures occur suddenly no doubt the cause would be investigated and corrected.

In order to determine the exact effect of reducing nozzles and disarranging front end apparatus to overcome the effects of these leaks and to improve the gradually failing steaming qualities of the locomotive, the Fuel Conservation Section authorized a series of tests to be conducted to see what the losses amounted to in increased fuel consumption and decreased locomotive efficiency.

In conducting these tests no particular locomotive was selected, the locomotive tested being one in regular chain gang freight service and assumed by all concerned to be in good condition. Draft gages were used in front and behind the diaphragm, in the firebox and in the ash pan. In addition to the draft readings, pyrometer readings were also taken at stated intervals as well as cylinder indicator cards at various speeds and cut-off. A dynamometer car was employed in order to register the draw bar pull under varying conditions so that the results obtained would not be based on the tonnage alone, but equated on the train resistance. The tender was cut off, drained and weighed prior to taking coal on each trip. Only the coal consumed in actually pulling the train was taken into consideration, all coal used on sidings and at other stops being used from a separate source.

The locomotive tested was of the light Mikado type and superheated, having cylinders 26 x 30 in., 63-in. driving wheels, 200 lb. steam pressure, with a calculated tractive

effort of 54,720 lb. The tests were conducted over a double track freight division, 91 miles long, having a maximum grade of .67 per cent, the same engine crew being used throughout all tests.

The first trip was made with the locomotive as found. On the completion of this trip, the openings around the steam pipes were packed with rope asbestos, and it was found that the average draft in the front end was raised two inches, as shown by the draft gage. As this now gave a vacuum in the front end greater than necessary, to produce the desired vacuum in the firebox it was decided to open the nozzle a sufficient amount to reduce this.

On the first trip it was found that the draft gage in front of the diaphragm registered practically double the height of the column of water as registered by the draft gage behind the diaphragm, indicating that the draft plate was so adjusted as to offer quite an obstruction to the flow of gases from the firebox to the atmosphere. It was, therefore, decided to raise this plate in order to better equalize the draft.

On the next trip the openings around the steam pipes were again packed with asbestos and front end cement, as inspection on arrival showed that the greater part of the packing applied on the previous trip had pulled out. The nozzle was enlarged $\frac{1}{8}$ inch in diameter, and the draft plate raised as noted in the preceding paragraph. On this trip the locomotive showed a marked decrease in the consumption of coal per 1,000 gross ton miles equated on the draft bar pull as registered by the dynamometer car. It also showed a decrease in cylinder back pressure at the same speed and cut off, due, of course, to the enlarging of the nozzle.

As the front end vacuum was still greater than necessary in order to maintain the proper firebox vacuum, it was decided to further increase the diameter of the nozzle on the following trip.

On the next trip the nozzle was enlarged $\frac{1}{8}$ inch more in diameter, or a total of $\frac{1}{4}$ inch above the size originally carried. The draft sheet was left as adjusted on the previous trip. Finding, however, that the packing around the steam pipes had again partially pulled out, it was decided to seal these openings by means of plates made of No. 10 gage steel, slightly corrugated, the outer circumference of these plates being welded to the smoke arch on the inside of the arch and the inner circumference of the plates welded to the steam pipes. An electric welder was used, thereby permanently sealing these openings. On this trip, while the locomotive did not show any decrease in fuel consumption per 1,000 gross ton miles over the previous trip, it did show an increase in locomotive efficiency, due to the further increase in the size of the exhaust nozzle, and as a point had now been reached where the fuel consumption and locomotive efficiency practically balanced, and it having been decided that any further increase in the size of the exhaust nozzle would affect the steaming of the locomotive to such an extent as to increase the coal consumption and thereby offset anything that might be gained through a further reduction in back pressure the tests were concluded on the basis of the last test run.

The final results can be briefly summarized in the following statement: Opening the nozzle $\frac{1}{4}$ inch or 4.5 per cent of the diameter, giving an increase of 9.3 per cent in area, resulted in a decrease in fuel consumption of 14.3 to 21.17 per cent, the comparisons as shown for the different trips wherein the larger nozzle was used being 14.3, 17.2, 18.2 and 21.17 per cent, the difference being due to variations in the quality of coal, weather conditions, etc. The efficiency of the locomotive was increased from 8.1 to 16.5 per cent, based on the averages at various speeds and cut off, as shown by indicator cards and dynamometer records. The locomotive steamed equally as well with the larger nozzle as with the one originally used. The raising of the diaphragm resulted in a better distribution of the draft over the fire, and

this in turn decreased the fuel consumption approximately 3 per cent.

On the whole, the tests brought out forcibly the necessity of maintaining nozzles with the largest possible diameter consistent with good steaming; of maintaining air tight front ends in order that the large nozzle can be successfully used, and of so adjusting the draft plate as to maintain an even distribution of draft over the entire grate surface, as well as to carry it at such a height as to provide ample area for the free flow of gases from the firebox to the stack.

Discussion

Good results in eliminating leaks around steam pipes were reported by using stuffing boxes. Rope asbestos was found to be more satisfactory than cements, but no material could be found that would remain tight for a week.

Other Papers

A paper was also read on Internal Combustion versus Steam Engine for Small Stationary Plants; by C. A. Lichty, inspector, purchasing department, Chicago & North Western.

Train Accidents In April¹

THE FOLLOWING is a list of the most notable train accidents that occurred on the railways of the United States in the month of April, 1919:

Collisions					
Date	Road	Place	Kind of accident	Kind of train	Kil'd Inj'd
10.	Phila. & Reading....	Locust Summit	xc	F.	3 0
26.	Ill. Central	Memphis	bc	F. & F.	5 6
29.	C. B. & Q.....	Walshville	bc	F. & F.	0 3
29.	Del. L. & W.....	Taylor	xc	F. & F.	4 1
Derailments					
Date	Road	Place	Cause of derailment	Kind of train	Kil'd Inj'd
8.	Chicago R. I. & P....	White, S. D.	b. rail	P.	1 0
10.	Union Pacific	Halford	snow	P.	2 1
11.	Pennsylvania	Emsworth	.....	F.	0 0
11.	Pennsylvania	Emsworth	.....	P.	0 0
13.	Cleve. C. C. & St. L.	Gillespie, Ill.	.....	P.	0 2
14.	Missouri, K. & T....	Hunter	b. wheel	F.	0 0
*22.	St. Louis-S. F.....	Lawton, Okla.	unx	F.	0 3
27.	Denver & R. G.....	Cimarron	d. car.	P.	0 34
29.	Lehigh V.	Newport	b. journal	P.	0 23
*30.	Pennsylvania	Sabula	unx	F.	0 0

The train involved in the collision near Locust Summit, Pa., on the 10th of April was a through freight, consisting of locomotive 1050 and 35 loaded cars. Because of the breaking of a drawhead the engine and eight cars were moved forward to Gordon, where the eight cars were set off; and the engine, returning to its train, collided with the rear portion, which had been left standing on a grade but had started down the grade because of the leaking of the air cylinders. The train had been standing about 45 minutes, and none of the hand brakes had been set. Eighteen cars were badly damaged, and the conductor, one brakeman and the fireman were killed.

The trains in collision near Memphis, Tenn., on the 26th, were an employees' train, carrying men to work, about 7. a. m., and a locomotive without train; a butting collision in a dense fog. Both engines were damaged. This collision was not on the main track. Five employees were killed, and six were injured.

The trains in collision at Walshville, Ill., on the 29th (at 2:40 a. m.) were southbound freight No. 6,102 and northbound freight No. 6,122. Both engines and several cars were badly damaged. The southbound train had run

¹ Abbreviations and marks used in Accident List:

* rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Mislaid switch—acc, Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P, or Pass., Passenger train—F, or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

past the appointed meeting place, train orders having been overlooked. The road was blocked twelve hours. Two trainmen were injured.

The trains in collision at Taylor, Pa., on the night of the 29th of April were a yard freight of ten cars, standing motionless on a yard running track, and a train of three locomotives and one caboose, the engines moving backward and pushing the caboose. Of the five trainmen on the caboose, four were killed and one was injured. A switch tender had been directed to forbid the entrance of the train of locomotives on the track occupied by the standing cars, but neglected to do so, and is held responsible; also the man in charge of the standing freight is held responsible for failing to protect, either by a red light on the end car or by hand lantern.

The train derailed near White, S. D., on the 8th was westbound passenger No. 417. The engine was overturned, and the engineman fatally injured. The cause of the derailment is believed to have been a broken rail.

The train derailed near Halford, Kan., on the 10th was eastbound No. 186, a mixed train with two engines and a snowplow. Moving at about 20 miles an hour, the plow was overturned in a drift and both engines were derailed. One engineman and one fireman were killed, and the other fireman was injured.

The passenger train derailed at Emsworth, Pa., on the 11th of April was west bound express No. 1,007. The line of road at this point is four-track. A westbound freight had been derailed by the automatic application of the brakes, and several cars were thrown afoul of an eastbound track. These cars caused the derailment of an eastbound freight which came along within a few minutes. The path of the passenger train was also blocked, and this was the cause of the derailment of that train, only the engine and the baggage car being thrown off the rails.

The train derailed near Gillespie, Ill., on the 13th was westbound passenger No. 5. The engine and first three cars were thrown off the track and partly overturned. Two mail clerks were injured.

The train derailed near Hunter, Tex., on the 14th was a northbound stock train. Fourteen cars were ditched and about 300 animals were killed, part of them steers and part sheep. The derailment was caused by a broken wheel.

The train derailed on the St. Louis-San Francisco near Lawton, Okla., on the 22nd of April was extra freight No. 734, consisting of one locomotive and 21 cars, including 19 cars of oil. Fire broke out in the wreck and 9 cars of oil, the caboose and a pile bridge, about 300 ft. long, were burnt up. Estimated loss \$27,000. One drover and two trainmen were slightly injured. The cause of the derailment was not determined.

The train derailed near Cimarron, Col., on the 27th was westbound passenger No. 315. Three coaches were overturned. Thirty-four passengers were injured, most of them not seriously. This section of the road is narrow gage. The baggage car, heavily loaded, was thrown off the track on a ten degree curve by the body side-bearings fouling bolts on the front truck.

The train derailed at Newport, Pa., on the 29th was an eastbound passenger ascending a steep grade at low speed. The second of the two locomotives hauling the train ran off the track, and with its tender, the first two cars and the tender of the leading locomotive, fell into the ditch. Twenty-three passengers were slightly injured. The cause of the derailment was a broken journal.

The train derailed at Sabula, Pa., on the 30th was an extra freight consisting of 44 cars. One or more cars in this train were derailed in Sabula tunnel, presumably by the fall of a brake beam, and the derailment was followed by a fire which destroyed 13 cars and contents, and damaged much other freight. Estimated loss \$125,000. The fire

raged 42 hours, and it is expected that the road through the tunnel will not be passable before July 1.

Electric Car Accidents.—At Muncie, Ind., on the 9th, a street car was struck by a freight train of the Lake Erie & Western, and three passengers in the car were killed and four injured.

Railway Affairs in Congress

WASHINGTON, D. C.

THE HOUSE COMMITTEE on appropriations was expected to take up this week consideration of the \$1,-200,000,000 appropriation asked by the Railroad Administration and to give Director General Hines an opportunity to explain it. The debate on the bill in Congress is expected also to give many members an opportunity to air their views on the subject of the government's management of the railroads.

Senator A. B. Cummins of Iowa has been made chairman of the Senate Committee on Interstate Commerce as expected. The other Republican members are C. E. Townsend, Michigan; Robert M. LaFollette, Wisconsin; Miles Poindexter, Washington; James E. Watson, Indiana; F. B. Kellogg, Minnesota; George P. McLean, Connecticut, and the following new members: B. M. Fernald, Maine; J. S. Frelinghuysen, New Jersey, and S. B. Elkins, West Virginia. The Democratic members have not yet been selected.

The Democratic members of the House Committee on interstate and foreign commerce are as follows: T. W. Sims, Tennessee; F. E. Doremus, Michigan; A. W. Barkley, Kentucky; Sam Rayburn, Texas; A. L. Montague, Virginia; Charles P. Coady, Maryland; A. G. DeWalt, Pennsylvania, and J. Y. Sanders, Louisiana. The names of the Republican members were published last week.

Senator Cummins announced that the Senate Committee on Interstate Commerce would be called together immediately and that the probable order of action would be as follows: First, the bill to restore the telegraph and telephone lines; second, the bill to restore the Interstate Commerce Commission's authority over rates; third, the Poindexter long and short haul bill, and finally the general railroad question. He said that after a concrete plan has been decided upon by the committee he planned to hold further hearings to allow the suggestion of changes considered advisable. Chairman Esch of the House committee expects to begin by holding a series of hearings.

It is reported that many members of Congress are preparing to discuss the action of the six leading steel companies in submitting identical bids on rail to the Railroad Administration and that there will be a demand for an inquiry by the Department of Justice.

The House appropriations committee has decided to include an appropriation of \$2,000,000 for the Alaska railroad in the general deficiency bill.

Bills introduced in Congress affecting the railroads include the following: By Representative French, a bill, H. R. 1438, to promote the safety of travelers and employees by compelling common carriers to adopt uniform rules for the operation of trains and to use a uniform system of signals for authorizing the movement of trains. By senator Jones of Washington, S. 632, to prohibit trespassing. By Senator Townsend of Michigan, S. 647, to provide for federal incorporation of railroads, and S. 648, to amend the powers of the Interstate Commerce Commission. Senator Nugent of Idaho has presented to Congress resolutions adopted by the Idaho Legislature favoring the return of the railroads to private management as soon as it can be accomplished without confusion or losses.

Railway Developments in Foreign Countries

Head of England's Largest Railway Union on Visit Here;
Reduced Fares in England Defeated.

J. H. Thomas, general secretary of the National Union of Railwaymen (Great Britain) and a member of Parliament, is on a visit to the United States, having arrived in New York on Saturday last. Mr. Thomas is a leader in British railway labor matters and conducted the negotiations with the British Board of Trade and the Railway Executive Committee which recently resulted in important concessions to the railwaymen.

German State Railways

The Constitutional Committee in Weimar, by an almost unanimous decision, recently laid down the principle of a united German State railway system. The Bavarian Government representatives alone protested. According to despatches the taking over of the whole of the railway systems by the State Government by means of an agreement until April, 1921, has been decided upon.

Simplon-Orient Express

The new Simplon-Orient Express left Paris on its first journey about the middle of April. The train will run daily via Dijon, Vallorbe, Lausanne, the Simplon Tunnel, Milan, Verona, Venice and Trieste. At Vincovce the train is divided, one section, on Sundays, Tuesdays, Thursdays and Saturdays, going via Verciorova to Bukarest; and the other, on Mondays, Wednesdays and Fridays, direct to Belgrade and eventually to Nish, Sofia and Constantinople.

London Traffic Congestion

The London members of the British Parliament decided May 6 to ask the cabinet to appoint a select committee to inquire into the question of London traffic and the steps that are necessary to relieve the present severe congestion. They took this step after hearing important evidence from the so-called "combine" which controls the London District Railway, the tube railways and the motor omnibus services. One of the difficulties presented was a shortage of money to effect additions and improvements to the services in the way of building extensions to the tubes, purchasing more equipment, etc.

Prominent British Steel Men Not

Worried Over American Competition

The bogey of American competition in the British iron and steel trades is regarded by one of Britain's foremost iron and steel men as undoubtedly exaggerated, says the American Chamber of Commerce in London.

Although the British prices have gone up as the result of the removal of the government subsidies, this expert says there is a tremendous demand among the neutral countries for iron and steel at almost any price, and expects this demand to take care of the British export production.

The American Chamber of Commerce in London understands on the other hand that British interests themselves are making extensive purchases of American iron and steel.

Another Mexican Railway Project

Several of the larger American and other foreign oil companies which are operating in the Gulf coast region of Mexico have joined in the project of constructing a rail-

road between Tampico and Tuxpam, a distance of about 125 miles. Among the corporations that are interested in the building of the proposed line are the Mexican Petroleum Company and the Eagle or Aguila Oil Company. Application for a concession to build and operate the road has been made to the department of communications and public works of the Mexican government. While the line will be primarily for the purpose of affording transportation for supplies and materials for the different oil fields it will do a general freight and passenger business.

Increase in Exports Over Pre-War Period

The increase in exports of railway supplies and of manufactures in general is clearly shown in a compilation recently issued by the National City Bank of New York. The compilation gives the figures of exports for the nine months ended March, 1919, as compared with those for the nine months ended March, 1914. The figures for locomotives and for rails are as follows:

	Nine months ended	
	March, 1919	March, 1914
Locomotives—		
Number	657	308
Value	\$16,775,710	\$2,918,714
Rails—		
Tons	422,046	282,621
Value	\$27,693,550	\$8,637,346

Australian Railway Development

A proposal is being considered in Australia of building a railway from the Northern Territory to the border of Queensland or continuing the Great Northern Railway to Camowael or Lake Nash. The Queensland line is now at Dajarra. The route has not been surveyed, but the distance would probably be about from 120 to 150 miles, and with the exception of the first 10 miles from Dajarra the country presents no engineering difficulties. It may perhaps be found preferable to connect from the Great Northern line from Dobbyn by an extension through Mount Oxide, and Gregory Downs to the border north of Camowael. Either of the proposals mentioned would fill the conditions of the proposal made by Lord Forrest to the Queensland Government in the early part of 1914, which was that Queensland should continue its railway to the border in the vicinity of Camowael, so that the Commonwealth Government might extend the Pine River railway from Katherine to Newcastle, and through the Barclay tableland.

New Canals for Finland

Several important canal schemes are at present being put forward in Finland, with a view to extending the existing canals and establishing new connections between the many inland lakes and the Finnish and Bothnian Gulfs. The most important proposals before the Finnish Senate are those for connecting the lake of Paijanne with Safma Lake and with the Gulf of Finland. The route to be followed is along the Kymene River. Another project is a canal from Wiborg to the River Vuoksen and thence to the harbor of Kivisalmi, north of Kexholm, suitable for ships of 1,000 tons. The towns of Tammerfors and Bjorneborg and the communes on the Kumo River are agitating for a canal from the Bothnian Gulf to Lake Paijanne via Pyhajarvi Lempaala, and Valkeakoski. The old Saima Canal

may also be modernized by extending the width of the locks to 68m., thus enabling ships of 700-800 tons from the inland waterways of Russia to pass through. With regard to the new railways some 650 km. are at present under construction at a cost of 250,000,000 Finnish marks.

New Railways Projected in Colombia

The Assembly of Antioquia, says a special correspondent to the Latin American section of the New York Sun, has approved the first project law, which orders the outline of the railway between a point on the Amaga Railway and the Department of Caldas, passing through Fredonia and other municipalities of the southwest, where agriculture thrives greatly. This project law authorizes the governor to arrange a loan of 5,000,000 pesos.

The national executive, says the same correspondent, has approved the provision of the departmental government for the reorganization of the work on the Puerto Wilches Railway. In Santander it has been agreed to receive at par (as they are not received in other parts) the bonds that the government issued, and the value of these, or \$120,000, is to be used to prolong as far as possible the line of the existing railway. For handling the fund and reorganization of the work a commission has been created whose members are the Governor, the secretary of finance and Victor M. Ogliastri, Pedro E. Novoa and Ambrosio Mantilla.

Railway Extensions in Sweden

After some three or four years' work, the Special Commission appointed to draw up a scheme for a complete reorganization of the railway connections of Stockholm has now prepared a full and comprehensive plan, involving an outlay of from \$25,000,000 to \$30,000,000. The proposal is based upon the probable traffic 30 or 40 years hence. So far as the passenger traffic is concerned, a new line of access is placed east of the existing one, and will proceed across the Arstaviken (the future Hammarbyleden, a new and important harbor) on a bridge so constructed as to give a clear height of about 85 ft. above ordinary water level. The west trunk line will run in an almost straight line through part of Sodermalm, where a large station is to be constructed. From this station the railway will run in a northerly direction through a tunnel under the Maria Hill to the southern shore of Lake Malaren, which will be crossed on a viaduct, and thence will pass the western shore of the Riddarholmen, crossing the Norrström on another bridge, which joins the Klara shore to the west of the present line, the new line gradually falling as it approaches the Klara shore. The central station is to occupy the site of the present main station, and the departure and arrival passengers are to be kept entirely apart. The station, it is believed, could be finished in 1927.

Belgian Light Railway Construction

During the war a certain amount of information was available as to the damage inflicted by the Germans on the Belgian national light railways, and it is now possible, says the Railway Gazette (London) to supplement this by details gleaned on the spot. The damage falls under three heads: The taking up of tracks that could be used to better advantage elsewhere, which is a legitimate military action; the destruction or damage of lines to hamper the movements of the Allied forces after the armistice, and purely wanton damage undertaken out of spite or malice. Examples of all three abound, although it is often very difficult to determine under which category any individual damage falls. On certain routes one motor past mile after mile of light railway on which the ballasting, overhead wires, notice boards, etc., have been left entirely intact, but from which every rail and sleeper has been removed. Such lines seem without any doubt to have

been removed in order to be employed by the Germans for legitimate purposes in districts nearer the scene of actual military operations. Elsewhere one sees miles of track partially damaged, one set of rails being more or less intact, while the other has been wrenched from its foundations and twisted. On other sections, lines have been rendered useless for miles on end by the dynamiting of every rail joint, so that the ends of each rail are curved upwards. There is a good deal of this particular destruction near the French frontier, and most of it seems to fall within the category of purely spiteful damage.

Publicity Department for Belgian Railways

The Belgian Ministry of Railways, Marine, Post, Telegraph and Telephone, has established a special department for press and publicity in charge of C. Joset as director with headquarters at Brussels. The establishment of the new department, says Consul Charles Roy Nasmith, Brussels, was brought about by a royal decree resulting from a report to the King by the Minister of Railways. This report, outlining the functions of the bureau, reads almost as if it had been written by an American, or, at least, by someone who had made a study of American conditions. It said:

The advantage derived from publicity in commercial enterprises needs no longer any proof, and in order to be convinced of this it is only necessary to look around and see what is being done in other countries by public organizations and by private firms.

The Ministry of Railways, Marine, Post, Telegraph and Telephone would increase by this means the income of its different departments.

Also the public would be informed regularly and systematically of all the regulations, changes and reforms introduced from time to time to improve the different services in the interests of the population and to present, by means of an intelligent propaganda and publicity, the advantages derived from the changes.

On the other hand the department possesses a wonderful means of publicity in its official publications, such as its railway time-tables, telephone directories, also in its thousands of waiting rooms, platforms, post offices, railway cars, steamers, where the public can find an excellent opportunity to advertise.

Here is a source of considerable revenue which can be derived for the government if this means of advertising is made use of in centralizing all the services which have to do with this and suppressing the system of exploiting these opportunities through private sources.

Last of all, in the interest of a good operation of the administration, it is most desirable to give continually in the public press all the criticism made concerning the organization and operation of the different public services of the Ministry of Railways, Marine, Post, Telegraph and Telephone, and these criticisms should be examined thoroughly without delay to see whether they are well founded, and, if so, remedies should be adopted at once as far as possible.

For the above reasons I have the honor to propose to your Majesty the creating of a department for the press and publicity, whose action will extend to all the departments and administrations of the Ministry of Railways, Marine, Post, Telegraph and Telephone, and which will systematically put to profit all the advantages to be derived from the press and publicity.

Bill for Lower Passenger Fares on

British Railways Defeated

The British House of Commons on May 7 defeated a bill introduced by a private member calling for the restoration of pre-war passenger fares and for the reduction of the 50 per cent increase introduced during the war. In the discussion considerable objection was made also to the "scandalous overcrowding" on the railways.

Mr. Bridgeman, parliamentary secretary to the Board of Trade, in opposing the measure on the part of the government introduced some interesting figures by way of explanation of the overcrowding. He showed that there was a serious shortage of equipment and explained that to reduce fares would encourage travel and result in greater congestion.

The present conditions of things, he said, made it quite impossible to do what was asked. There had been taken for the purposes of the war overseas, 1,600 passenger coaches and 700 locomotives. Of the locomotives, about 300, he thought, had now been returned to this country. Not one of these 300 was in action; every one was undergoing repairs. Of the 1,600 coaches, not one had yet been returned to this country. Owing to the war, the ordinary repairs and new construction had fallen seriously into arrears. In normal times in Great Britain 3 per cent of the

rolling stock was under repair, and something like 10 per cent of the locomotives. At the present time 10½ per cent of the passenger coaches and 20 per cent of the locomotives were under repair. The ordinary annual requirements to keep up stock in normal times was 600 or 700 new engines per year. During the war something like 100 or 200 engines had been constructed annually. That meant that during the years of the war there had been a loss of new engines, and those of the most modern and largest type, of 2,000. The normal new construction in coach building was something like 6,000 new coaches a year. During the war there had been practically none. The fact that England had thus lost a huge quantity of passenger coaches which ought to have been serving the public was no fault of the Board of Trade or the Railway Executive Committee. If fault there was, it should be placed on the Germans.

With regard to cheap fares he also said the companies'

expenses were more than double what they were before the war. The public should be very thankful that the companies were only asking 50 per cent increase for what cost them over 100 per cent more. If the 50 per cent were taken off, the companies would be involved in a loss calculated at \$100,000,000.

Sir Auckland Geddes, minister of national service and reconstruction (not to be confused with Sir Eric), acting in the absence of Sir Albert Stanley, president of the Board of Trade, who also spoke against the bill and showed that conditions were being remedied as fast as possible. He said that 2,677 trains had been restored within a few weeks. The Caledonian Railway of Scotland had added 250; the London & North Western, 650, in spite of the fact that the railway lines were still pressed with the necessity for carrying returning soldiers and still suffering for lack of men and supplies.

Missouri Pacific Saves \$279,843 By Water Treatment

This Result is Equivalent to a Return of 181 Per Cent on
Investment in 52 Plants

By R. C. Bardwell,

Chief Chemist, Missouri Pacific, St. Louis

DURING 1918, the water softening plants on the Missouri Pacific treated 1,368,305,000 gal. of water, removing from this water 3,589,473 lb. of scale forming matter. There are 52 water treating plants on this system, the majority being in the hard water district of the plains west of Kansas City, although the plant of largest capacity is situated at North Little Rock, Arkansas. These plants, which represent an investment of \$154,300, have been in service from 2 to 13 years. On the basis of a saving of 11 cents per pound of incrusting matter eliminated before the water was delivered to the locomotives, as outlined by the Water Service committee of the American Railway Engineering Association in 1914 and corrected to conform with present high prices for labor and material, the total saving to the railroad from the removal of this scaling material amounted to \$369,716. The cost of treatment, including labor, chemicals, maintenance, and 10 per cent on the investment to cover depreciation in treating facilities, was \$89,873, leaving a net saving of \$279,843 or 181 per cent on the amount invested.

The benefits resulting from water treatment are numerous but mostly of an intangible nature and difficult to convert into direct financial returns. However, values were placed on four items, the saving of fuel resulting from the removal of the insulating effect of the scale, the increased life of flues, the decreased repair work on flues and boilers in the roundhouse, and the saving in engine time while down for repairs. The average cost of coal was increased \$0.90 per ton, a set of flues \$216, engine time \$12 per day, and roundhouse flue repairs 135 per cent over the prices used by the committee in 1914. The saving brought about by the reduction in engine failures and delays to traffic, and also the quicker turning of locomotives with the increased service is much greater, owing to the large increase in overtime rates for employees as well as stringent power shortage during this period.

Approximately 700 of the 1094 locomotives operated by this company were directly effected by the use of the treated water. The total gross saving of \$369,716 is equivalent to

a gross saving of \$529 per engine or a net saving of \$400, which appears reasonable in view of the generally improved performance.

The 3,589,473 lb. of scaling matter removed from the water would be equivalent to 36 carloads of 50 tons each. If this scale had been allowed to go into the locomotives a conservative estimate of the portion adhering to the tubes and sheets would not have been below 25 per cent. This means that with the untreated water an average of 1282 lb. of scale would have been deposited in each of the 700 engines, forming an insulating coating about ⅛ in. thick on all exposed boiler surfaces. As a matter of fact the scale would have been much thicker and heavier in some districts, as, on several divisions, ¾ in. scale was not uncommon after 6 to 8 months' service before the installation of softening plants which caused large loss in locomotive operation.

The best available data indicates that an insulating scale of ⅛ in. thickness causes an increase of between 15 and 20 per cent in fuel consumption. Using the average rate of six pounds of water per pound of coal burned, 946,411 tons of coal were required to evaporate the 1,368,305,000 gal. of water into steam at boiler temperatures. It is safe to presume that at least 10 per cent more coal would have been consumed if the scale originally present had been allowed to accumulate on the tubes and sheets instead of having been removed before the water was given to the locomotives. The increased fuel consumption which would have followed the use of untreated water would have amounted to about 100,000 tons for the year 1918, which is an important item for the period, particularly when the general shortage of coal and cars is considered.

Of the 52 water treating plants on the system, 31 are of the intermittent type and 21 continuous. The majority were installed by company forces on designs furnished by the engineering department. The plants were designed to afford all possible use of facilities already existing at a minimum expense. Where convenient, an additional roadside tank was

installed with necessary air pipes for agitation and a steam jet or ejector for adding the chemicals. At small stations where the rate of pumping is low, a small inside tank with filter and mixing box was placed in the roadside tank and chemicals added continuously with the water. In large standpipe-type steel tanks good success has been secured by putting the chemicals and water through cylindrical down-take tube and drawing off the water at proper height after sufficient time has allowed clarification without use of filter. Good results have also been secured in a large capacity con-

stitute an explanation. Frequent inspections are made at points where trouble is indicated or expected and inconsistencies corrected.

It has been found that an important item in securing satisfactory results from water treatment lies in adequate supervision. Any type of treating plant conforming to the three essential principles, proper chemical proportioning, suitable mixing and agitation, and sufficient settling period, will give satisfactory results with proper attention. Not only must the chemical formula and treatment be checked, but the satisfactory operation and condition of the facilities must be assured by frequent inspection. Lax attention may easily result in loss many times in excess of cost for adequate supervision. This supervision should not be confined to treatment alone but extends from inspection of quality and condition of chemicals through the operation of plant and to final action of the water as indicated by locomotive performance.

The accompanying chart shows the record of operation at each of the 52 plants. The source of supply and hardness of the raw water are noted. Figures are given for each plant showing the consumption, the amount of scale-forming solids removed, the cost of treating facilities, the cost of operation including chemicals, labor, maintenance, and 10 per cent for depreciation, and also the estimated saving secured.

The most serious trouble now encountered in locomotive operation and upkeep from the effect, or in conjunction with the use of water, is pitting. Its action is irregular in appearance and frequency variable, so that considerable difficulty is met in tracing cause or source. However, experience and records thus far made indicate that pitting on non-treated water districts has become more noticeable and severe than on districts where treated water is used. Investigations and experiments tend to indicate that water carrying a slight caustic soda alkalinity, which would also mean but a slight amount of scale, gives the best results in service. On two engine districts in Western Kansas and Eastern Colorado treating plants have been installed at all water stations so that this condition may be assured all water given to locomotives. These 25 plants have now been in service about two years and although the entire elimination of pitting has not been secured to date, the attack on fireboxes appears to have been stopped and the greatly improved condition and service of the flues would indicate that the small amount of pitting taking place may be due to scab pits on old flues which have been replaced in the boilers.

Summarizing the benefits of treated water as noted to date:

- 1.—A large saving has been made in fuel consumption owing to the elimination of heavy insulating scale.
- 2.—Roundhouse boiler repairs have been reduced on treated water districts from 30 to 60 per cent.
- 3.—Life of flues has been increased from 30 to 300 per cent with corresponding betterment of general boiler conditions.
- 4.—Pitting has been materially reduced with increased life of flues and fireboxes.
- 5.—Engine failures from boiler troubles on treated water districts have been very materially reduced with corresponding improvement in general traffic conditions.

The regular quarterly dividend of 1½ per cent of the Pennsylvania, payable March 31, goes to 110,374 stockholders. This compares with 108,546 stockholders on the Pennsylvania books last February, and with 103,003 stockholders in May, 1918, and with 93,639 in May, 1917. Only two per cent of the Pennsylvania dividends now goes abroad, comparing with 15 per cent of the total which was sent abroad before the war. This means that about \$65,000,000 Pennsylvania stock has been returned to America since 1914.

RESULTS OF WATER TREATMENT ON MISSOURI PACIFIC

Station	Source of Supply	Raw Water Hardness in Grains Per Gallon	Annual Consumption in Gallons	Pounds of Scale Removed	Original Cost of Treating Facilities	Total Additional Cost for Treatment	Total Saving
Dupo, Ill.	Well. i*	29	145655000	495227	\$ 2800	\$ 7193	\$33204
Frederic, Mo.	Well. i	25	32340000	97020	3000	1800	10672
Gorham, Ill.	Well. i	22	39840000	103294	7000	2037	11360
Bush, Ill.	Creek. c	7-61	52634000	105268	1900	3847	7780
DeSoto, Mo.	Creek. i	10-30	42891000	94560	5000	1952	10880
Bismark, Mo.	Well. i	44	36419000	201404	4200	5228	22184
Piedmont, Mo.	Creek. i	5-16	43944000	58732	4200	1508	5899
Medalia	Well. o	19	26339000	57946	1500	1826	4874
Kansas City	River. i	12-22	139940000	238898	10000	9260	26198
Kans. Mo.	Well. i	51	4866000	31622	3800	1420	3476
Elevator Oak Mills, Kans.	Well. o	30	6146000	22125	1500	804	2433
Auburn, Neb.	Well. i	30	19514000	50542	7500	2146	6449
Union, Neb.	Creek. c	15-32	16200000	16800	3000	759	1782
Waynes, Neb.	Creek. i	8-16	8069000	8060	2000	558	587
Berlin, Neb.	Well. o	28	1405000	5058	750	145	556
LaPlatte, Neb.	Creek. c	14-21	11759000	19990	750	307	2199
Greenleaf, Kans.	Well. i	26-44	8108000	32422	3000	980	3567
Concordia, Kans.	Well. i	32	6421000	26326	2200	829	2995
Jamestown, Kans.	Well. o	18	3998000	7996	750	272	879
Downs, Kans.	Well. o	16-18	16696000	33592	6000	1001	3673
Lenora, Kans.	Well. i	21	1641000	5928	550	187	432
Berlin, Kans.	Creek. i	15-25	13122000	70732	5000	2215	9660
Cypress Cy. Kans.	Creek. c	12-40	16191000	48573	3000	1191	5343
Marquette, Kans.	Well. o	24	16389000	49167	750	1466	5408
Bushon, Kans.	Well. o	17	13206000	26412	750	597	2906
Wilmington, Kans.	Well. i	16-19	57206000	120130	5000	1969	13214
Bison, Kans.	Well. o	16	3387000	12419	1000	290	1476
LaCrosse, Kans.	Well. o	14	5913000	7090	1000	268	780
Brownell, Kans.	Well. o	12	12275000	10412	750	555	2025
Pendennis, Kans.	Well. i	14	8645000	13704	2300	563	1507
Healy, Kans.	Well. i	12	4335000	4768	2200	389	524
Scott City, Kans.	Well. i	13	9925000	12902	2000	521	1419
Carondo, Kans.	Well. o	11	5732000	5732	1000	275	630
Selkirk, Kans.	Well. i	14	12844000	16690	2200	575	1286
Stuart, Colo.	Well. i	34	10791000	45401	2200	1049	5104
Esda, Colo.	Well. i	22	12625000	32718	2000	792	2528
Esawell, Colo.	Well. i	32	8369000	33476	2000	776	2022
Arlington, Colo.	Well. i	60	1879000	15032	1800	618	1650
Ordway, Colo.	Res. i	18-25	13080000	65190	3000	1808	7170
Fowler, Colo.	Well. i	12	2033000	2439	2200	497	289
Pueblo, Colo.	Well. i	13-30	29165000	64055	2200	1277	7040
Wichita Shops	Well. i	50	61580000	367854	3000	9090	42658
LeRoy, Kans.	Creek. i	11-48	13524000	27048	3000	1445	2970
Hopewell, Kans.	Creek. c	7-15	7062000	11283	750	387	1240
Conway, Kans.	Creek. c	12-25	5442000	11682	1000	490	1276
Cedarvale, Kans.	Creek. c	18-20	3825000	6492	1000	478	716
Winfield, Kans.	Creek. c	8-140	5896000	27800	1000	555	2958
Olcott, Kans.	Well. i	14	3853000	7708	800	530	847
North Little Rock	Well. o	22	22924000	504390	15000	12123	56621
Lynn, Ark.	Well. i	27	14881000	41666	3600	1295	4283
Wynne, Ark.	Well. i	22	4667000	70000	3400	1805	7700
McGehee, Ark.	Well. i	20	48900000	107680	4200	2450	11845
Total			1,568,308,000	2,504,473	\$1,543,000	\$9,975	\$56,716

Note: Cost of Treating Facilities includes cost of additional tank where more than one is used, pipe lines, and other appurtenances. Cost of Treatment includes cost of additional labor, chemicals, and maintenance, plus 10 per cent of investment in treating facilities. * i indicates intermittent plants; o indicates continuous water softener.

tinuous plant with constant head and float regulator for the chemical proportioning.

The plants are operated by the regular pumpmen and maintained by the division water service forces. The treatment is regulated and general supervision given by chemists located at Little Rock, Ark., and Kansas City, Mo., these being convenient central points. Semi-weekly samples of both the raw and treated water are furnished these laboratories and results of these tests are reported to division as well as general headquarters. A limit of six grains per gallon for hardness remaining in the water after treatment is allowed for satisfactory results and all results above this limit neces-

Doings of the United States Railroad Administration

Orders for Open Hearth Rail Have Been Placed With Six Steel Companies; Price Protested.

WASHINGTON, D. C.

AN APPROPRIATION OF \$1,200,000,000, instead of the \$750,000,000 held up by the Senate filibuster at the last session, which the Railroad Administration got along without for a time by issuing certificates of indebtedness, is now required by the Railroad Administration to restore its "revolving fund" to a state of animation and to carry out through the balance of this year the purposes for which that fund was intended. This added to the \$500,000,000 originally appropriated for a revolving fund would make a total of \$1,700,000,000, of which practically all except the amount temporarily tied up for working capital has been expended or represents an obligation of the government, but \$1,214,000,000 should eventually be repaid.

The estimate was transmitted by Director General Hines to the Secretary of the Treasury and by him submitted to Congress on May 24.

The amount now asked for includes \$486,000,000 to cover the operating deficit for the 16 months of government operation of the railroads up to April 30, which alone is nearly enough to wipe out the original fund. In addition \$425,000,000 is desired for working capital, which represents what the original appropriation has in fact been largely used for, because the deficit is more than covered by the amounts as yet unpaid to the railroad companies for rental. Another \$775,000,000 represents amounts advanced or to be advanced for the account of the companies and which they will have to pay back. About \$14,000,000 is for expenditures for inland waterways. Therefore \$1,214,000,000 of the \$1,700,000,000 which would be represented by the two appropriations should eventually be returned to the government.

The \$486,000,000, representing the deficit shown by the figures now available up to April 30, Mr. Hines believes should be treated as loss due to the war and paid out of the treasury, which means by the taxpayers rather than by the shippers and passengers. Beyond that point he attempts no forecast but his recent speeches indicate that he hopes an increase in traffic, together with what economies in operation are found possible, will pull the roads through the remainder of the year. Until better information as to the tendency of future months is available he declines to decide the question of an advance in rates but presumably that would be the next step if the deficits should continue, unless these should be small enough to be absorbed from the working capital, although Mr. Hines does not promise that he will never ask for another appropriation.

In his letter to Secretary Glass Mr. Hines said:

"I have the honor to submit herewith an estimate in the sum of \$1,200,000,000, to be immediately available and to remain available until expended, and to be added to and considered a part of the 'revolving fund,' provided for in Section 6 of the act approved March 21, 1918. This additional sum would be expended in the same manner and for the same purpose and under the same conditions as the amount appropriated in the above mentioned section.

"This appropriation is needed for:

Requirements for 1918

Amount necessary to defray operating deficit—the difference between the standard rental payable to the railroad companies, and the net operating income, for the year 1918..	\$236,184,940
For net excess of current assets over current liabilities, partly available for the immediate working capital requirements	201,938,198
Improvements on inland waterways.....	2,641,886
Amounts advanced for account of railroad companies to enable them to pay in part their current liabilities.....	100,000,000

Amount of additions and betterments' expenditures, including equipment, made to the railroad companies' properties during 1918, which must be carried by the Railroad Administration for the time being.....	352,553,455
Loans during 1918 to railroad companies not immediately repayable	48,483,959
Total requirements for 1918.....	941,802,438
Less amount heretofore appropriated.....	500,000,000

Balance required for 1918..... \$441,802,438

Estimated Requirements for 1919

For amount of additions and betterments' expenditures, including equipment, made and to be made to the railroad companies' properties during 1919, which it is believed will have to be carried by the Railroad Administration for the time being.....	253,435,760
For improvements to develop inland waterways.....	11,700,000
For financing Boston & Maine Railroad Company reorganization	20,000,000
For operating deficit for first four months of 1919.....	250,000,000
For additional working capital.....	223,061,802

Total estimated requirements for 1919..... \$758,197,562
Grand total requirements for 1918 and 1919..... 1,200,000,000

"The operating deficit of \$236,184,940 for the year 1918 was due largely to two facts: First, the winter of 1918 was unprecedented in its severity and in its costly effect on railroad operations; and, second, the increases in passenger and freight rates averaging about 25 per cent were in effect for only a few days in excess of six months, while heavily increased expenses due to war conditions were effective on an ascending scale throughout the twelve months.

"The operating deficit of approximately \$250,000,000 for the first four months of 1919 is due in part to the cumulative high levels of cost, brought about by the war, for labor and materials and in part to the sudden and abnormal falling off of business as a result of the cessation of war activities, the sudden drop in the demand for fuel and for other basic commodities, and the general state of hesitancy due to the transition from war conditions to peace conditions. The fact that the present period is transitional and apparently on the eve of important changes has made it expedient to defer, until the matter can be more accurately measured, the consideration of the question, now frequently raised, of an increase in rates.

"In my judgment, the deficits for 1918 and for the readjustment period of 1919 are clearly losses due to the war and ought to be treated as such. By reason of the abnormal after-the-war factors tending to important changes in the situation, the estimate herewith submitted does not attempt to forecast results beyond the first four months of this calendar year.

"If the amount here requested shall be appropriated the total appropriation for the Railroad Administration will have been \$1,700,000,000. Of this amount \$1,214,000,000 will represent amounts which should be returned to the government, \$425,000,000 thereof being temporarily tied up in working capital and \$775,000,000 thereof representing amounts which have been and will be advanced for the account of the railroad corporations and which it will be their duty to repay as rapidly as practicable. About \$14,000,000 will represent expenditures for equipment on Inland Waterways.

"Of the entire \$1,700,000,000, \$486,000,000 represents the aggregate loss to the government up to April 30, 1919, on account of the two deficits above explained.

"The sum of approximately \$223,000,000 for increased working capital is requested because experience has demonstrated that the amount of working capital actually available for current use on December 31, 1918, was insufficient to admit of the free and unrestricted payment of payrolls

and vouchers for materials and supplies throughout the country. There is manifestly great advantage both in the economical purchase of materials and supplies, and the handling of such transactions to the satisfaction of the business public in having an ample supply of working cash."

That the Railroad Administration really needs the money, if any one is inclined to doubt it, can be made readily apparent by regrouping Mr. Hines' figures as follows:

Of the total of \$1,700,000,000, at least \$990,000,000 has already been actually expended or become payable:

Deficit	\$486,185,000
Additions and betterments in 1918.....	352,553,000
Advances to railroads.....	100,000,000
Loans	48,484,000
Inland waterway improvements in 1918.....	2,642,000
	<hr/>
	\$989,864,000

Adding to this \$425,000,000 for working capital makes \$1,415,000,000, leaving to be expended in 1919 not more than the balance of \$285,000,000, divided as follows:

Additions and betterments.....	\$253,436,000
Inland waterway improvements.....	11,700,000
Boston & Maine reorganization.....	20,000,000
	<hr/>
	\$285,136,000

Grand total \$1,700,000,000

Some of the \$253,000,000 has already been expended since the first of the year, but no report has been issued of the expenditures for capital account since January 1.

Up to April 30 the Railroad Administration had paid to the railroad companies on account of rental \$494,913,615. As the total rental for 16 months amounts to about \$1,237,000,000, this left a balance of \$742,000,000 unpaid. Also \$403,000,000 of standard equipment had been ordered, of which \$164,000,000 had been paid for after delivery, leaving a balance of over \$239,000,000 to be paid. This the Railroad Administration is still trying to make the railroads finance, and it is allowing them \$100,000,000 on depreciation account to pay the first 25 per cent on it. About \$149,000,000 of certificates of indebtedness had been issued up to April 30 on account of compensation and for equipment, but this amount is included in the \$742,000,000 unpaid compensation and the balance payable for equipment.

The estimate now is \$450,000,000 greater than that submitted by Mr. Hines on January 24. As the deficit estimated at that time was \$196,000,000, and it is now \$290,000,000 greater than that, only \$160,000,000 of the increase is for other purposes. The \$750,000,000 was made up of \$382,000,000 required to settle accounts for 1918, and \$368,000,000 to be used toward financing capital expenditures for 1919, of which \$286,000,000 was for equipment, \$12,000,000 was for waterways and \$20,000,000 for the Boston & Maine, leaving \$50,000,000 for additions and betterments. As only \$285,000,000 of capital expenditures is provided for in the new estimate for 1919, the \$1,200,000,000 apparently provides \$83,000,000 less for capital expenditures than did the former estimate. The former estimate of the amount required to settle the accounts for 1918 is increased by \$60,000,000 from \$382,000,000 to \$442,000,000, and the amount required for 1919 is increased from \$368,000,000 to \$758,000,000 or \$390,000,000, of which increase \$250,000,000 is for deficit and \$223,000,000 for additional working capital, so the amount provided specifically for capital expenditures is \$83,000,000 less than before.

The two estimates may be compared as follows:

Former estimate:	
To settle accounts for 1918, including \$196,000,000 deficit	\$382,000,000
For capital purposes in 1919.....	368,000,000
Total	<hr/>
	\$750,000,000
New estimate:	
To settle accounts for 1918, including \$236,000,000 deficit	\$442,000,000
Four months' deficit in 1919.....	250,000,000
For additional working capital.....	223,000,000
For capital purposes in 1919.....	285,000,000
	<hr/>
	\$1,200,000,000

The amount expended for capital improvements in 1918 was \$575,000,000, and the amount carried over into 1919 of the budget authorized last year was \$683,000,000, which was reduced by revision to \$607,000,000, including \$290,000,000 for standard equipment. Almost no new work has thus far been authorized since the first of the year. Therefore, as Mr. Hines estimates the amount of additions and betterments which will have to be carried by the Railroad Administration at \$253,000,000, it would seem that if much new work is undertaken it will have to be financed by the companies. In connection with his former estimate, Mr. Hines calculated that the railroad companies would have to borrow \$291,000,000 for capital improvements, while about \$150,000,000 could be deducted from the companies' rental toward capital expenditures. This \$150,000,000 plus the \$253,000,000, which the Railroad Administration proposes to carry, would leave \$204,000,000 for the companies to finance of the carry-over from last year, and this would be reduced by the \$100,000,000 depreciation payment. Last year's capital expenditures were chiefly financed by the Railroad Administration, except that \$214,000,000 was paid for by deductions from the companies' rentals in accordance with the provisions of the compensation contracts.

It is expected, however, that the passage of the appropriation, making possible the payment of the large amounts due the companies for rental, together with the prospect of the return to corporate management, would so improve the credit of the roads that the companies will undertake to finance a considerable program of improvements on their own account by way of preparation for the resumption of operation by the companies, especially as any improvement work undertaken now would hardly be completed much before the date set for the return of the properties.

Rail Orders Placed—Price Protested

The Railroad Administration on May 23 placed its first rail order since the railroads were taken over by the government; it was for 200,000 tons of open hearth rail, which was divided between the six leading steel companies, the Carnegie Steel Company, the Illinois Steel Company, the Tennessee Coal & Iron Company, the Colorado Fuel & Iron Company, the Bethlehem Steel Company and the Lackawanna Steel Company. The first three are subsidiaries of the United States Steel Corporation. The price is \$47 a ton, which was the price proposed to and approved by the Industrial Board of the Department of Commerce. These six companies, according to a statement issued by Director General Hines, in response to the Railroad Administration's request for bids, submitted bids which are uniform in all respects as to price and conditions of manufacture and are in strict accordance with those proposed to and approved by the Industrial Board. A seventh company, the Midvale Steel & Ordnance Company, proposed prices \$10 greater; in other words, \$55 for Bessemer and \$57 for open hearth.

Mr. Hines said the orders were placed in view of the immediate need for rail and "not only without approval of the prices, but for the reasons shown below, with emphatic disapproval of the prices and the manner in which they have been established." Mr. Hines said that when the Industrial Board approved the prices proposed by the steel interests it became at once apparent to him, and he so indicated in various discussions with representatives of the government, that that approval would encourage the steel interests to stand together on those prices, even though governmental approval was withheld. He felt, however, that "even so it would be far more in the public interest for the government to withhold approval and, if necessary, pay such prices for the time being under protest rather than endorse the prices, and that, too, for the entire calendar year, as was proposed

by the Industrial Board, and thereby give an official sanction to prices which were unreasonably high and which would merely serve as a starting point for still higher prices later on." "The result," he says, "has been in exact accordance with this forecast. That the action of these six companies in making uniform bids was taken under the leadership of the United States Steel Corporation is clear from the fact that immediately after the Railroad Administration announced finally that it would not approve the prices fixed by the Industrial Board, Judge Gary for the Steel Corporation took the initiative in announcing publicly that the Steel Corporation was strictly maintaining the prices approved by the Industrial Board, and that it seemed to him that would be the attitude of other manufacturers. The subsequent action of the Steel Corporation and the other manufacturers in submitting their bids has accorded completely with Judge Gary's announcement."

Apparently Mr. Hines feels that it is no longer possible to delay placing orders because of the controversy as to prices. He expected that, after the position taken by the steel companies in the negotiations while the Industrial Board was still in existence, they would not at first make any concessions in the price then offered, but apparently he hopes for a different result when bids are asked for an additional tonnage of rail. The present order is to be delivered by August 1 and will just about keep the mills going at the rate they have been delivering rails thus far this year. While the price represents a reduction of \$10 as compared with the price named last year by the War Industries Board, which was never officially approved by the President, because of the opposition of Director General McAdoo, no orders were placed at that price by the railroads. Some orders were placed by the War and Navy Departments, and the same figure was applied to some export orders. The rail which has been delivered during 1918 and this year on orders placed before federal control has been at prices ranging up to \$40 a ton, and the standard open hearth price prior to the war was \$30, so that the present price represents an increase of 56 per cent.

In his statement announcing the order, Mr. Hines pointed to the large profits of the steel companies, saying:

"The Steel Corporation's annual report to its stockholders shows that after paying all wages and other operating and maintenance expenses and allowing most liberally for renewals and paying interest on debt of subsidiary companies, and also taxes other than war taxes and excess profits taxes, it had net earnings on all rolled steel products of \$21.58 per ton in 1916, \$35.73 per ton in 1917, and \$33.53 in 1918. It is a remarkable fact that in the calendar years 1917 and 1918 the net earnings of the Steel Corporation aggregated approximately \$1,000,000,000, being in excess of the annual rental which Congress has sanctioned as reasonable for practically the entire railroad mileage in the United States. It is true the Steel Corporation had to pay out of these net earnings heavy excess profits taxes to the government, but even after paying these taxes, making liberal allowance for depreciation, and extraordinary replacement funds, and after paying interest on bonds and 7 per cent on preferred stock there remained an earning of 39.2 per cent on its common stock in 1917 and of 22.0 per cent on its common stock in 1918. The fact that excess profits taxes were paid out of the net earnings in 1917 and 1918 does not in any way detract from the accuracy of those net earnings as a measure of the productivity of the war prices which were charged by the Steel Corporation.

"These figures of actual net earnings per ton on the entire output of the Steel Corporation are much more convincing than estimated costs of rolling a particular steel product at a particular mill. The estimated costs may show the greatest variation, but the ultimate result is an enormous profit to the stockholders of the corporation. The claim that the wages of labor would be endangered by a reasonable price on steel is therefore not convincing.

"Heavy profits are not confined to the Steel Corporation. It

appears that the net earnings of the Lackawanna Steel Company were \$12.40 per ton in 1916, \$24.81 in 1917, and \$19.88 in 1918; of the Republic Iron and Steel were \$13.88 per ton in 1916 and \$25.92 in 1917, and its profits for 1918 are not yet available; of the Colorado Fuel and Iron Company were \$9.57 per ton in the year ending June 30, 1916, and \$13.91 per ton in the year ending June 30, 1917. The Bethlehem Steel Company furnished no reports that give any information as to the profits per ton. In considering all these profits it must be remembered that the reductions from war prices which were proposed by the steel interests and are now being adhered to by them as the greatest reductions they are willing to make, are practically completely offset by the great fall in the price of scrap iron alone (which can be and is used largely as a substitute for pig iron in the manufacture of steel), without regard to the various other reductions in cost which are coming about as a result of readjustment to peace conditions.

"A seventh steel company, the Midvale Steel & Ordnance Company, in response to the request of the Railroad Administration for bids, proposed prices \$10 in excess of the prices proposed by the other six companies. It is interesting to note that the company which made this proposal showed on all its steel products net earnings in 1916 of \$24.62 per ton, in 1917 of \$44.23 per ton and in 1918 of \$35.93 per ton. Its apparent position now is that it cannot afford to make any reduction in the price of steel rail without reducing the wages of labor.

"It is important to remember that the present policy of the steel interests in adhering to high prices on the ground that the present high costs necessitate these prices, is a policy that does not work both ways. It is a policy to keep prices from going lower as business increases and costs diminish. It will be remembered that the Industrial Board announced that the public could not expect prices to be lower during this calendar year, but it gave the public no hope that they would not go higher. The resumption of business in the country will probably result in the substantial diminution in the cost of steel production, but unless the attention of the public is constantly centered on the situation there is danger that the steel interests will take advantage of the increased demand to increase the prices of steel still further, even in the face of declining costs.

"The situation in the steel industry is of greatest moment to the American public. The United States Steel Corporation is the largest producer and controls approximately 50 per cent of the output. It takes the lead in maintaining a price which, if its reports to stockholders are reliable, indicates a grossly excessive profit, and it does this for the avowed purpose of protecting alleged high cost producers, which, however, so far as they make detailed reports on the subject to their stockholders, also indicate large profits. In other words, the Steel Corporation appears to take the position that for the protection of other prosperous steel producers it is unwilling to initiate any competition in the steel industry and naturally these other producers are glad to follow this lead, and incidentally this position enables it to continue the enjoyment of very high profits. This condition operates to suspend the law of supply and demand when it could work in favor of the consumer, but it leaves that law free to operate with the greatest effect when it can work in favor of the manufacturer. This situation also works to deprive the public of the benefits of the increased efficiency due to the great combinations in the steel business. Those combinations are the result of public acquiescence, and yet all the benefits of them go not to the public, but to the private owners. The more powerful the combinations become the more successful they are in keeping up prices.

"These reasons lead me to reiterate that the prices in question are unreasonably high at present and will become progressively more unreasonable as business improves and conditions become more nearly normal."

Commenting upon Mr. Hines' statement, George N. Peek, formerly chairman of the Industrial Board, issued a statement saying that the board had brought about a \$5 greater reduction than had previously been offered to the Railroad Administration. He said:

"The statement of the director general of railroads is perhaps misleading in that he uses as a basis for his deductions the profit showing of the past three years when steel mills were crowded to capacity on account of war demands.

and during a considerable part of which period prices were fixed by the government with the idea that production must be stimulated to the limit.

"If the director general desires to be fair, why does he not take selling prices for the pre-war period on rails, for example, and admit that to the pre-war price of rails, \$30 a ton, there must be added approximately \$20 per ton on account of the increase in direct labor cost alone, exclusive of the increase in cost of labor in transportation? And further, why does he ignore the fact that since the signing of the armistice steel prices generally have been reduced between 15 and 25 per cent?

"The statement is further misleading in that Mr. Hines neglects to inform the public that the price at which he finally concludes to purchase rails, \$47 per ton (the figure approved by the Industrial Board) is \$5 per ton lower than the best the Railroad Administration was able to secure for itself before the Industrial Board considered present costs of production.

"I quote the following from page 27 of the minutes of the meeting of April 5 between the Industrial Board and Mr. Hines' representatives, Judge Lovett and Henry Walters, and H. B. Spencer, director of the Division of Purchases of the Railroad Administration:

"Mr. Peek—I understand the best price you were able to secure three weeks ago was \$52 a ton. This price is \$5 under that.

"Mr. Spencer—True."

The division of the order gives 100,000 tons to the three subsidiaries of the Steel Corporation; 40,000 to the Bethlehem Steel Company, and 20,000 to the Colorado Fuel & Iron Company. The exact division between the Carnegie, Illinois and Tennessee companies was to be adjusted in relation to the present capacity of the mills in order to get the quickest delivery and in order to give the preponderance to eastern mills. The tonnage has been apportioned to the seven regions as follows: Eastern, 40,000 tons; Southern, 28,400; Allegheny, 50,000; Pocahontas, 15,000; Southwestern, 29,000; Central Western, 28,600, and Northwestern, 9,000.

The allocation by roads is being made by the regional directors. About 45 roads are scheduled to receive the rail, which will be rolled and drilled in accordance with the individual specifications of each road.

Automatic Train Control Committee

E. L. Adams, formerly in the signal department of the Lake Shore & Michigan Southern, and for the last few years connected with the bureau of valuation of the Interstate Commerce Commission, has been appointed assistant to G. E. Ellis, executive secretary of the Committee on Automatic Train Control of the Railroad Administration.

Preparations for Handling Bumper Grain Crops

Director General Hines announces that the Railroad Administration is giving careful consideration to the measures necessary for the satisfactory transportation of the anticipated large crops of grains. The Department of Agriculture has estimated that the yield of winter wheat will exceed 900,000,000 bushels. A fair estimate of the yield of spring wheat approximates 300,000,000 bushels. The total yield of wheat this year will in all probability exceed the total of last year by from three to four hundred millions of bushels. No estimate of other grains is, of course, possible at this time, but barring unusual climatic conditions, it can perhaps be properly expected that the tonnage in grain that will be produced this year will exceed that of last year by a considerable margin.

The stable price fixed last year by the government on wheat naturally provoked a desire on the part of producer to realize his earnings as quickly as possible, and since a

stable price has again been fixed by the government for this year's crop, it is assumed a similar condition will obtain. Last year this economic condition, coupled with more or less disarrangement in ocean tonnage and consequent disruption in shipping, resulted in such an acute situation at the interior grain markets and at seaports, that it became necessary to install the so-called "permit system," which was early made operative at the ports, and in September, 1918, at the principal interior markets. Arrangements are now being made to apply the same system this year.

The permit system, Mr. Hines says, is a highly beneficial system of controlling traffic at the sources to prevent serious congestion on the road and at destination. This system prevented in the fall of 1918 the serious transportation paralysis which had been experienced in former years due to widespread congestion of traffic which had been shipped but which could not be disposed of at destination. This was most apparent in the East, but its injurious effects were felt throughout the country. It was the principal cause of car shortages in every part of the country and slowed down the movement of traffic and impaired the transportation service everywhere.

While the permit system at the ports is still in operation, it was suspended a few months ago at the interior markets, due to improved ocean shipping and the fact that the bulk of the grain had been moved. It is, however, to be expected that the system will again be inaugurated with the opening of the new wheat season, and in view of that probability the Railroad Administration is already preparing the necessary machinery so that it may be prepared to act without delay at the proper time. Conferences have already been held with representatives of the grain corporation.

As graphically illustrating the necessity of regulating the transportation of this tonnage, and the results obtained from such regulation, the following facts are of value and interesting: For the nine months of the crop year, July 1, 1918, to May 1, 1919, there passed through the grain handling facilities of the country—elevators and mills—a total of 3,440,236,000 bushels of all grains, although the highest point of grain storage of all kinds, at any one time in that period, was 480,000,000 bushels. That is, in nine months the flow of grain was seven times the quantity which accumulated in storage at the highest point during that period. This is a direct illustration of the necessity of keeping the grain handling facilities of the country liquid, to avoid the distress to all interests that would follow the blocking of this flow of grain.

The permit system as operated last year contemplated the closest co-operation between the Railroad Administration and the United States Food Administration-Grain Corporation. The local representatives of the grain corporation were in daily contact with the grain control committees at each market, and in view of the very comprehensive data and information in their possession as to storage facilities, anticipated movements out of markets, the needs of different sections of the county, not only as to wheat but as to others cereals that flow co-incidentally with wheat, etc., were of invaluable aid in the accomplishment of the permit system with a minimum economic disturbance. The same character of assistance is being arranged for from the grain corporation, or the wheat director, in anticipation that it will be necessary to reinaugurate the permit plan within the next one or two months.

The wheat director is as vitally interested as the Railroad Administration that the grain tonnage shall be handled with the least possible friction as between all interests concerned, and is in entire harmony with the Railroad Administration as to the plans proposed in that direction.

It is stated to be the intention to keep the public fully in-

formed of the plans for the transportation of the enormous grain crop, and that through the co-operation of all interests concerned it should be possible to meet what otherwise might prove a difficult situation.

Regional Directors Congratulated

on Victory Loan Showing

Walker D. Hines, director general of railroads, has sent the following telegram of congratulation to all regional directors:

"I desire to congratulate officers and employees of railroads under government control for the splendidly patriotic response made by them in the Victory Liberty Loan campaign. Out of a total of 1,841,267 employees, 1,417,042, or 77 per cent, subscribed for Victory Liberty Loan notes, a total of \$138,627,250. Employees of 16 roads showed subscriptions of 100 per cent. This is a renewed demonstration of the loyalty of the railroad men of America."

Cost of Train and Locomotive

Service Shows Gain in Efficiency

The total cost of train service, including locomotive service, in March was 119.5 cents per 1,000 gross ton miles, according to a monthly report compiled by the Operating Statistics Section, which shows that results are being obtained from the Railroad Administration's campaign for more economical operation. No comparative figure for 1918 is given but the cost in March represents a decrease as compared with February, when it was 126.5 cents. The cost of locomotive service per locomotive mile in March was 119.2 cents as compared with 100.1 cents in March, 1918. This also represents a decrease as compared with February of this year, when the figure was 120.7 cents. The cost of train service per train mile was 167.5 cents in March, as compared with 145.1 cents in March, 1918, and 169.3 cents in February of this year. The increase in cost of locomotive service in March this year over March last year was 19.1 per cent, and the increase in cost of train service was 15.4 per cent. All items of cost show increases as compared with last year except that of train enginemen, which was 18.8 cents in both years per locomotive mile and 21.3 cents, as compared with 21.8 cents per train mile. The item of trainmen shows an increase from 24.4 cents to 25.6 cents. The combined cost for trainmen and enginemen per 1,000 gross ton miles was 33.5 cents. The figures are reported by roads and by regions and districts. The combined figures are as follows:

	March, 1919	March, 1918
Cost of locomotive service per locomotive mile.....	119.2	100.1
Locomotive repairs	40.1	30.7
Enginehouse expenses	10.2	6.7
Train enginemen	18.8	18.8
Locomotive fuel	46.3	41.0
Other locomotive supplies.....	3.8	2.9
Cost of train service per train mile.....	167.5	145.1
Locomotive repairs	57.1	43.4
Enginehouse expenses	52.6	47.6
Locomotive fuel	4.4	3.3
Other locomotive supplies.....	21.3	21.8
Train enginemen	25.6	24.4
Trainmen	6.5	4.6
Train supplies and expenses.....		
Cost of train service per 1,000 gross ton miles.....	119.5	126.5
Locomotive repairs	40.8	43.1
Enginehouse expenses	37.5	40.3
Locomotive fuel	3.1	3.4
Other locomotive supplies.....	33.5	34.8
Enginemen and trainmen	4.6	4.8
Train supplies and expenses.....		

The comparisons with last year are disturbed to some extent by the factor of back pay being included in this year's figures, while last year's figures do not include the increases in wages which became effective later in the year. Most of the figures, however, show decreases as compared with Feb-

ruary. Locomotive repairs and enginehouse expenses cost 2.3 cents less per 1,000 gross ton miles in March than in February, locomotive fuel 2.8 cents less, other locomotive supplies .3 cents less, enginemen and trainmen 1.3 cents less, and train supplies and expenses .2 cents less.

The January figures were shown only for individual roads, with no combined totals by regions or for the roads, as a whole.

Suits Against Director General

In General Order No. 18-B issued by the director general, General Order No. 18, issued April 9, 1918, as amended by General Order No. 18-A, issued April 18, 1918, is further amended to read as follows:

"It is therefore ordered that all suits against the director general of railroads as authorized by General Order No. 50 must be brought in the county or district where the plaintiff resided at the time of the accrual of the cause of action or in the county or district where the cause of action arose; or where the cause of action would, but for federal control, accrue against the initial carrier (as under Section 20, paragraph 11), of the act to regulate commerce, such action may be brought in the county or district where the property was received for transportation."

Director General Hines has issued General Order No. 26-A, setting aside General Order No. 26 issued last May by Director General McAdoo as a war emergency order, which provided that suits against carriers for personal injury and freight damage claims brought in remote jurisdiction should not be tried during the period of federal control.

Punitive Overtime Up to Director General

The question as to whether the train service employees are to be allowed a punitive rate for overtime is again up to Director General Hines for decision. The brotherhoods have reiterated since the Railroad Administration has been in control their demands for time and a half for overtime which was waived during the negotiations which preceded the enactment of the Adamson law. When Supplements 15 and 16 to General Order No. 27 were issued by Director General Hines in April the matter was referred to Board of Adjustment No. 1 for a report. The board, however, was not able to agree, and has submitted two separate reports, one of which presumably represents the views of the brotherhood representatives on the board, while the other represents the views of the managers of the roads. Before deciding, Director General Hines has ordered an investigation as to the cost of paying punitive overtime in road service.

Contracts Executed

The Railroad Administration has executed compensation contracts with the Wiggins Ferry Company providing for an annual payment of \$416,675.60, the St. Louis Merchants' Bridge & Terminal Railway for \$412,427.56, the Wrightsville & Tennille, for \$41,027, and the Louisville & Wadley, \$5,367.

Ignes Fatui on the Track

[From the Omaha Bee.]

A thousand or more dollars' worth of automobile tires was stolen from a car in the North Western yards in Council Bluffs late Thursday night. A freight train was held up as it was approaching the Union Pacific transfer. Half a dozen red lights, were strung along the track, and when the conductor and his men went forward to investigate, after the train was brought to a sudden stop, they found nothing but the red lights. They were strung half a mile down the track, and it took several minutes to investigate. The delay gave the thieves all the time needed to break into the car containing the tires and get a truck load of them.

Convention of Master Boiler Makers' Association

Location of Brick Arches, Ash Pan Design and Best Method of Bracing Tenders Discussed

THE MASTER BOILER MAKERS' ASSOCIATION opened its eleventh convention at the Olympic Theater, Chicago, on May 26. Several hundred members were in attendance at the meeting which was the first this association has held since 1916. At the opening session an address was made by Frank McManamy, assistant director, Division of Operation, U. S. R. A. Mr. McManamy spoke of the benefit to be derived from a full discussion of new methods and practices at conventions and mentioned particularly the importance of some of the topics which had been made the subject of reports to be presented at this meeting. In closing he dwelt on the necessity for thorough workmanship in locomotive repairs.

Following Mr. McManamy's talk D. A. Lucas, president of the association, delivered the presidential address. The remainder of the first day's session was taken up by the reports of the secretary and treasurer and the transaction of routine business.

On Tuesday morning, addresses were made by A. G. Pack, chief inspector of locomotive boilers, and R. H. Aish-ton, regional director of the Northwestern Region.

Application of Brick Arches to Fireboxes

The minimum distance between the grates and the lower part of the arch at the throat sheet for different classes of locomotives depends upon the local conditions; that is, the grade of coal being used, whether it fills up badly or not; and whether the firemen have been taught to shake grates and keep the fire worked down. There are a great many engines which have eight inches as a minimum distance between the grates and the lower part of the arch, and the railroads are getting along very successfully with it.

The proper distance from the door sheet to the top of the brick arch and from the crown sheet to the top of the brick arch for various classes of locomotives is also a local condition. Arches have been run in a great many cases as close to the crown sheet as 11 in. with good results, but some railroads insist that the arch shall not be closer than 16 to 18 in. The distance from the door sheet to the top of the arch is a distance varying greatly, depending upon the length of the firebox. The arch should be run as long as possible in all cases and the top of the arch should be up higher than the top of the door.

The report was signed by L. M. Stewart (A. C. L.), chairman.

An individual report on this subject was submitted by E. W. Young, general boiler inspector, C. M. & St. P., an abstract of which is given below.

It is impossible to set any figure for the minimum distance between grates and the lower part of arch tubes for different classes of locomotives, as so many variables must be taken into account. The distance from the grates to the lower part of the arch tube may be less with a throat sheet that sets back at an angle from the vertical than for a throat sheet which is vertical. It may be less where the grate is flat, than where there is a steep pitch of the front end of the grate, or it may be less in a short firebox than in a long firebox.

The distance from the grates to the lower part of the arch tube may be less in a compound locomotive with its mild draft than in a simple locomotive with its sharp draft. It may be less with one grade of coal than with some other grade.

On account of the variable conditions, it is impossible to set any figure. A good rule and a simple one may be stated as follows: Locate the arch tubes as high above the grates as the design of the firebox will permit. In some cases the arch tubes have had to be located as near as 8 in. to the grate, and yet satisfactory results have been accomplished; however, better results will be obtained if the throat sheet be such that the distance of 18 in. can be obtained between the grates and the arch tubes. The proper distance from the door sheet to the brick arch in various classes of locomotives is just as difficult to determine as it is to answer the first question. One answer might be stated as follows: The brick arch should approach the door sheet as near as possible without restricting the area between the arch and the door sheet, to a figure below the gas area through the flues. It is very seldom, however, that we find a case where the arch can be run as close to the door sheet as the above rule would dictate, due to the fact that under such a condition the gas area between the arch and the crown sheet is unduly restricted. It might be stated that an arch may be built back to within 24 in. of the door sheet, provided conditions other than the relation of the arch to the door sheet will permit.

A good rule in connection with arch designs is that an arch should be as long as conditions will permit, and it is usually the case that these conditions must be studied from two or three angles before we can decide just what the length of the arch shall be, or what the distance shall be between the arch and the door sheet. It would be very much easier to get an ideal arch if the arch were first designed and then the firebox built around it. If the latter condition existed, it would be very easy to answer the two questions, and they would read about as follows: The grates should be placed 18 in. below the front end of the arch tubes. The door sheet should be placed about 24 in. from the back end of the arch. It should be understood, however, that the above two specifications can rarely be made use of for the very reason that arches are built into fireboxes instead of fireboxes built around arches.

Arch tubes must be so located in the flue sheet that there will be access to the front end of the arch tube through the waterleg. In order to get this access through the waterleg, and through a plug hole in the outside throat sheet, arch tube

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

Type	Distance between grates and lower part of arch tube, inches	Distance from door sheet to brick arch, inches
1-5	13½	45½
G-4	18	37
A-1	16	49
A-2 Straight top	13½	53½
A-2 Slope top	14	44½
B-4 Wide firebox	14½	64½
B-4 Narrow firebox	11½	67
G-6	13	46
K-1	24	59
L-2	23½	49
U. S. STANDARD LOCOMOTIVES		
060	10	28
0B0	10	37
4-6-2-A	13	53
4-6-2-B	15	47
2-6-2-A	13½	52
2-8-2-B	15	47
4-8-2-A	15	46
4-8-2-B	15	42
2-10-2-A	14½	42
2-10-2-B	15	59

locations are often found to be impracticably low and in such instances the special spacer block is used to elevate the front

course of arch brick, so that practical firing clearance is obtained.

The distances discussed above as found on the different types of locomotives used on the Chicago, Milwaukee & St. Paul, and also on the United States Standard Locomotives, are shown in the following table.

The use of syphons in the place of arch tubes will, in very many cases permit of considerably better firing clearance, than can be obtained where arch tubes are used. There may be many cases of firebox construction, in which an arch on syphons will be practical, while arches on arch tubes would be impracticable. Syphons make a good foundation for a brick arch, and on account of being so substantial they make a practical device to take the place of arch tubes.

Discussion

The discussion developed the fact that there was considerable difference of opinion regarding the proper location of the arch. The point was brought out, however, that it is largely governed by local conditions. It is considered necessary to have the area between the arch and the crown or door sheet from 10 to 25 per cent greater than the area through the tubes.

Design of Ash Pan and Draft Appliances

Your committee has failed to locate a recognized rule for designing ash pans. The result of our investigations indicates that methods are largely the result of experiments which have developed designs which seem best suited to the type of locomotive and condition of service. The objective to be attained was a self-cleaning arrangement of sufficient storage capacity to prevent the necessity of dumping the ashes except at regular ash pan cleaning points; and to prevent the cinders from burning and warping the pan. The lower parts are designed to be practically air tight, air for draft being admitted at the upper parts only. Ash pan air inlets of eight classes of locomotives averaged 14 per cent of the grate area which, from information obtainable, seems to be about the average air opening in ash pans for coal burning engines.

With the modern wide firebox, pans are made wide at the top, projecting several inches beyond the mud ring with vertical sides to prevent sparks from falling or being blown out by side winds. These upper plates are sloped toward the hopper or storage part so that cinders will slide to the hopper. There seems to be a tendency to sacrifice this slope to obtain greater draft opening, which has resulted in some instances in the cinders piling up on the wings and shutting off the draft, as well as causing stuck grates and burned grates and connecting bars. Therefore the slope from the hopper to the edge of the pan should be not less than 30 degrees and rather than lose this slope, it is better policy, if possible, to get increased air opening from back or front.

When locomotives are being designed, the ash pan should be considered and provided for as an important part of the machine, and not as something to be hung on after the locomotive has been set up. The modern ash pan is expensive to construct and still more expensive to maintain, and the greatest possibility of improvement seems to be in the designers who may find it practicable to change the frame lines or other parts sufficiently to give relief where it is greatly needed.

Maintenance of Ash Pan

Slides, hoppers and dumps should be maintained in an operative condition. Grates should be maintained in first-class condition. Broken, burned, or warped grates should not be allowed in service. One bad grate often causes damage to a whole section and also causes waste of fuel and damage to the ash pan.

No air openings should be allowed in the ash pans except those provided for in the design. This is particularly important in the case of oil burning locomotive draft pans, for the reason that air leaks permitted at other points than those designed usually result in brick work troubles as well as interfering with the proper steaming of the locomotive.

Air leaks at the lower parts of coal burning locomotive ash pans are extremely undesirable and annoying, not only on account of burning and warping the plates of the ash pan, but particularly on account of sparks dropping and causing fires along the right of way. It is a mooted point whether fires set from locomotives are not more frequently from the pans rather than the stack.

Front End Draft Appliances

The method of determining the design of front end draft appliances has, no doubt, as its basic principle, what was known as the master mechanics' front end, and like other parts, constant experiments and experience develop a type of front or setting to suit the conditions.

All parts of ash pan and front end appliances should be carefully fitted and securely bolted in place so that there is no reasonable probability of any part becoming displaced, and should be maintained at all times in first-class condition, each part performing its full function strictly in accordance with the design, particularly draft openings and passages which govern the flow of air and gases through the firebox flues and smoke arch. Dampers which are designed to be operated should be maintained in an operative condition and air admitted only at such points as the drawings provide for. Draft passages should be maintained so that all the drafts will pass through those channels, which is not the case if loose or poor fitting plates are allowed. Draft appliances, which include deflecting plates, nozzle, petticoat pipe and stack, may be designed and adjusted to thoroughly clean cinders from front ends, and because plates were not well fitted, leaks direct to the stack may be sufficient to defeat the object of the design, causing cinders to accumulate in the front end, sometimes resulting in burning and warping front end rings and doors and overheating the lower joints of exhaust and steam pipes and developing leaks at those parts.

Front End Leaks

The committee is of the opinion that positively no air leaks should be permitted and that where front ends show indications of burning on account of the combustion of cinders, it is just as often the result of poor fitting plates and air leaks as it is of faulty design or of wrong adjustment of draft appliances. We also incline to the opinion that we should make use of the autogenous welding process to secure permanently to the smoke arch and flue sheet a suitable sheet iron border to which to bolt deflecting plates. This border may be spot welded when being applied or welded in solid. At any rate, it can be an absolutely tight fit, in fact, air tight, if desired. An arrangement of this kind will expedite the work of applying or removing deflecting plates and simplify front end inspection. Petticoat pipes should be maintained to practically a true circle free from holes or indentations, and be securely held in central position between nozzle and stack.

As an item of interest to this association, and to give an idea of the general dimensions of draft openings, the following is given. We find in eight different classes of coal burning locomotives the following comparative dimensions of draft passages:

Eight Coal Burning Locomotives.—Ash pan air inlets equal 14 per cent of grate area, or 39.5 per cent of grate opening, and is 4 per cent more than flue opening area. From this it would appear that pan opening and flue open-

tanks made from steel plates of 5/16 in. thickness or less, because it gives better service than the old method of applying longitudinal angle iron bars with cross stays. Also it has the tendency to eliminate leaky rivets in anchor lugs. We are of the opinion that when *weight* is not taken in account when designing locomotive tenders if the tanks were made from heavier material, say steel sheets 3/8 in. thick, it would greatly simplify the matter of bracing as heavier material could be used which no doubt would be more satisfactory. However, with 1/4 in. plates for tank sides and top, and 5/16 in. plates for the bottom of the tank this is the best method of bracing, as it braces the tank in all its principal parts, and still leaves plenty of space on the interior so that the inspector can move around easily to make his inspection or repairs when necessary.

The report was signed by Thomas Lewis (L. V.), chairman; E. J. Sweeney (N. Y. C.), J. J. Orr (D. L. & W.), J. P. Malley (St. L. & S. F.) and J. T. Johnson (A. T. & S. F.).

Discussion

The superiority of vertical over horizontal braces was generally conceded. One of the principal sources of trouble reported was the loosening of the transverse braces. This can only be overcome by good workmanship and by substituting rivets for bolts in these parts.

Acetylene Welding

The committee in presenting this paper realized that this topic has been before the convention for several years and has been thoroughly threshed out by the members. We find it at this time very difficult to write up any new facts on this subject, however, we believe the following information will be beneficial.

Apparatus

Many shops a few years back were equipped with portable generators, using what is termed "high pressure." Later, new apparatus was installed and shops were piped throughout for the acetylene and oxygen, using low pressure, which at this time is in pretty general use throughout the United States. There are a number of shops that still use the oxygen and acetylene gas furnished in holders with the oxygen holders containing 1,800 to 2,000 lb., and the acetylene holders from 200 to 250 lbs. pressure. Where this method is used it is necessary to have the different regulators for the oxygen as well as the gas for each welder. But where the low pressure system is used, it is only necessary to have the regulators where the gas is generated and the oxygen manifolded. It is the opinion of the committee that the low pressure system piped throughout the different departments, both oxygen and acetylene, will give the best results.

Welding Torches

There are several different makes of welding torches on the market today, and while they will all do good work with an experienced operator, some torches are more quickly regulated and do not back-fire as readily as some other makes. In most all cases the welding tips are made up of copper and give much better results than the brass.

Cutting Torches

Many different styles of cutting torches are on the market. Some will back-fire readily, where with others it is almost impossible to make them back-fire, and in some cases both with the welding and cutting torches where they do back-fire, they can be ignited quickly from the heated iron without re-adjusting; while, with other makes, it is necessary to shut off and start all over. This causes a loss of time as well as a waste of material.

Different shops have different methods and are seemingly getting good results. On the Chicago, Milwaukee & St. Paul we are and have been welding in all our side sheets, bolting up securely, and applying stay bolts and rivets before welding. We are also welding all our cross-seams by removing rivets, scarfing down, and welding up all holes and are not removing any stay bolts, and are getting first-class results. We are welding in all our door collars, inside and out; three-quarter door sheets, one-half flue sheets, top or bottom; full flue sheets; front sections of crown sheet; welding in bottom patches of front flue sheet, 12 in. to 20 in. high and cutting off all our stay bolts and radial stays with the torch. In fact, we are doing everything in the line of welding we may find to do, and the sheets we are welding are standing up good and giving us no trouble. The only trouble we do have at times is welding in patches in old side sheets, or where side sheets go to pieces rapidly due to poor water conditions. Where engines are in bad water territory, sheets do bulge between the bolts and at times the weld is pulled in two.

In visiting the different railroad shops, I find that on firebox work, such as applying fireboxes, side sheets and door sheets, the welding in most cases is being done with the acetylene torch. Shops visited had both the acetylene and electric welding outfits, but were using the electric outfit mostly for welding flues, mud ring corners and roundhouse work, where I believe the portable electric welding outfit will give good results.

At this time we have just installed the electric welding outfits and figure on welding in all flues, mud ring corners, side sheets, cutting out the center and welding in new without removing mud ring rivets. We also figure on doing considerable firebox and boiler work with the electric welder, where flanges on front or back flue sheet are still good, cutting out the center and welding in new.

The report was signed by Henry J. Wandberg (C. M. & St. P.), chairman; L. M. Stewart (A. C. L.), J. J. Davey (Nor. Pac.), John Harthill (N. Y. C.), P. F. Gallagher (B. & O.) and T. F. Powers (C. & N. W.).

Discussion

The discussion developed the fact that there was a great diversity of opinion regarding the advisability of welding firebox seams. Some condemned the practice as unsafe while others contended that with proper care welded seams could be made stronger than riveted seams.

Some roads reported good results from welded tubes while others reported that the use of this practice had been a failure because of cracks in the bridges of tube sheets. All agreed that experience was essential for the production of satisfactory work. Some roads check the ability of welders by requiring weld specimens regularly each month; these specimens are then broken in a testing machine.

Exhibitors at Master

Boiler Makers' Convention

Following is a list of the companies exhibiting at the convention of the Master Boiler Makers' Association, Chicago, May 26 to 29, together with their representatives:

Air Reduction Sales Company, New York.—Automatic acetylene generators, compressed acetylene gas welding apparatus and supplies. Represented by E. L. Mills, B. N. Law, A. S. Kinsey, R. T. Peabody, A. C. LeQuellier.
American Arch Company, New York.—Security sectional arch. Represented by R. J. Himmelright, W. L. Allison, T. F. Kilcoyne, H. Darby, T. Mahor, G. C. Denney, G. Wagstaff, E. S. Nicholas, A. W. Clokey, J. P. Neff, J. T. Anthony.
American Flexible Staybolt Company, Pittsburgh, Pa.—American bolt, American plain radial stay, American reduced body staybolt, hollow iron staybolts, American rivet. Represented by R. F. Benson, C. A. Seley, L. W. Wedmeier, J. A. Trainer, M. M. McAllister, W. F. Heacock.
Besly & Co., Chas. H., Chicago.—Taps, dies and reamers. Represented by E. P. Wells.
Bird-Archer Company, The, New York.—Boiler chemicals, Harter cir-

culator plate. Represented by C. A. Bird, P. B. Bird, L. F. Wilson, H. E. Wheeler, J. L. Callahan, W. E. Ridenour, L. D. Bush.

Boss Nut Company, Chicago.—Bolts, nuts and rivets, and Boss lock nuts. Represented by J. A. MacLain, A. W. Fogg, W. Wilcoxsen.

W. L. Brubaker & Bros., New York.—Taps, dies and reamers. Represented by W. L. Brubaker, W. S. Rose.

Castle & Co., A. M., Chicago.—Representing Lukens Steel Company, American Rolling Mill Company, Champion Rivet Company, Reading Iron Company, Detroit Seamless Steel Tubes Company, Lennox shears. Represented by G. R. Boyce.

Central Iron & Steel Co., Harrisburg, Pa.—Photographs of steel products. Represented by W. P. Moore.

Chicago Pneumatic Tool Company, Chicago.—Air and electric tools. Represented by A. C. Andresen, A. E. Conrow, N. Thulin, H. J. Smith.

Cleveland Pneumatic Tool Company, Cleveland, Ohio.—Pneumatic tools, pressure seated valves, Bowes air hose couplings. Represented by H. S. Covey, A. Scott, H. C. Newton, R. E. Ahern.

Cleveland Punch & Shear Works Company, Cleveland, Ohio.

Cleveland Steel Tool Company, Cleveland, Ohio.—Punches, dies, pneumatic hammer rivet sets, chisel blanks. Represented by H. W. Leighton, Jr., W. S. Barnes, R. J. Venning, J. E. Stenger, T. B. Everts.

Dearborn Chemical Company, Chicago.—Represented by G. R. Carr, J. D. Purcell, L. B. Bowen, T. H. Price, J. F. Roddy, I. H. Bowen, H. Rehmeier, W. S. Reid.

Draper Manufacturing Company, Port Huron, Mich.—Double flue welder. Represented by T. Draper, J. A. McDonald.

Duntley-Dayton Company, Chicago.—Exhibiting—Pneumatic tools, Duntley-Dayton riveting and clipping hammers, "Red Devil" rivet cutter. Represented by H. P. Arnold, George Bardon, A. G. Rice.

Faessler Manufacturing Company, J. Moberly, Mo.—Boiler tube expanders and tube cutters. Represented by J. W. Faessler, G. R. Maupin.

Gary Screw & Bolt Company.

Globe Seamless Steel Tubes Company, Milwaukee, Wis.—Exhibiting—Seamless steel drawn mechanical tubing.

Hauck Manufacturing Company, Brooklyn, N. Y.

Hilles & Jones Company, Wilmington, Del.—Punching and shearing machinery. Represented by W. H. Connell, Jr.

Imperial Appliance Company, Chicago.—Oxy-acetylene welding and cutting apparatus. Represented by R. B. McIntosh, E. N. Stevens.

Ingersoll-Rand Company, New York.—Pneumatic tools. Represented by W. Johnson, C. J. Little.

Keller Pneumatic Tool Co., Grand Haven, Mich.—Pneumatic tools. Represented by Mr. McCabe.

Key Boiler Equipment Company, St. Louis, Mo.—Key safety hand hold cap, tube plugs, master hold plates and tools. Represented by E. Key.

Key-Bolt Appliance Company.

Locomotive Superheater Company, New York. Represented by G. E. Ryder.

Lovejoy Tool Works, Chicago, Ill.

Macleod Company, Cincinnati, O.—Compressed air oil burner, oil burner rivet forge, oxy-acetylene welding and cutting outfit. Represented by A. G. Hauck.

Mahr Manufacturing Company, Minneapolis, Minn.—Rivet forge, oil fired-oil burning torches. Represented by H. H. Warner, A. E. Stenzel.

McCabe Manufacturing Company, Lawrence, Mass.—Pneumatic flanging machines. Represented by F. H. McCabe.

Nathan Manufacturing Company, New York City.—Exhibiting—Injectors, lubricators, boiler checks, boiler washer and tester, gage cocks, coal sprinkler. Represented by Otto Best, F. C. Davern, W. R. Walsh, R. Welsh.

National Railway Devices Company, Chicago.—Shoemaker vertical fire door. Represented by J. G. Robinson, E. J. Gemderson, A. F. Lind.

National Tube Company, Pittsburgh, Pa.

Oxweld Railroad Service Company, Chicago.—Represented by C. B. Moore, G. W. Crownover, M. W. Leighton, F. Hasse, C. H. Hanson, J. F. Farker, W. Jones, F. Furbeck, W. A. Champieux, H. C. Reid, H. W. Schulze, A. West, H. E. Bemer, J. W. Evanston, R. B. Alfante, F. W. Shupert, S. Daffer, F. W. Frety, H. V. Gigandet, C. E. Allen, E. S. Richardson, O. F. Ladtkow, W. Robertson, W. Hogan.

Page Steel & Wire Company.

Parkesburg Iron Company, Parkesburg, Pa.—Charcoal iron boiler tubes.

Rego Welding Apparatus.

Rivet Cutting Gem Company, Cincinnati, O.

Rome Iron Mills, Inc., Rome, N. Y.—"Rome superior" staybolt iron, "Rome perfection" engine bolt, Rome hollow iron. Represented by B. A. Clements, C. C. Osterhout, E. Buker.

Ryerson & Co., Joseph T., Chicago.—Ulster special seamless hollow staybolt iron. Represented by H. Gray, J. P. Moses, J. Ponie, H. B. Hench, J. McGrath, E. W. Kavanaugh, E. S. Pike.

Scully Steel & Iron Company, Chicago, Ill.—Machinery small tools and everlasting blow-off valves. Represented by J. W. Patterson, J. A. Lindsley, Mr. Linkenfelter, Mr. Clark.

Torchweld Company, Chicago.—Welding and cutting equipment, portable and stationary plants, accessories and supplies. Represented by W. A. Slack, C. J. Nyquist, N. L. Fenstermaker.

Vulcan Engineering Sales Company, Chicago.—Hanna pneumatic riveters. Represented by J. T. Lee, J. O. Clark.

Welding Engineer, The.

Western Welding Equipment Company, Chicago.—Exhibiting K-G welding and cutting apparatus. Lincoln arc welders, electric and oxy-acetylene supplies. Represented by R. V. Gardner.

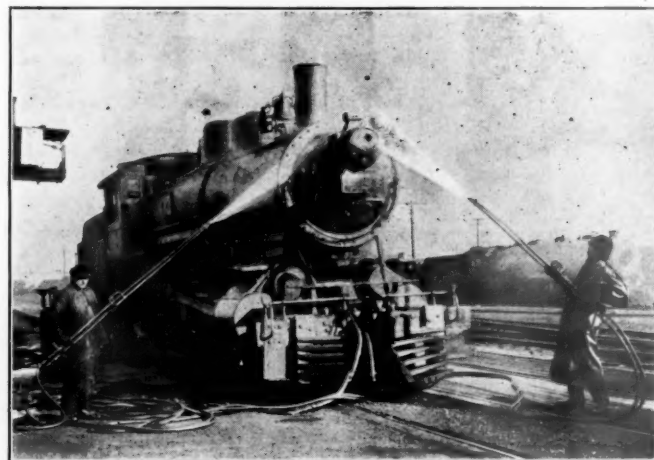
Wilson Welder & Metal Company.

Shipments of silver from the mint at Philadelphia to San Francisco during the past year, a part of the movement by which 265 million silver dollars were melted and transferred from this country to India, took 18 special trains, each train carrying from \$5,000,000 to \$10,000,000 in value. All of these movements were conducted in great secrecy.

A New Process for Cleaning Engines

THE cost of wiping locomotives with oil and waste under present conditions is very high, and there are now few roads on which the engines are thoroughly wiped at the end of each trip. Furthermore, cleaning by hand forces the oil and dirt into cracks and fillets and leaves a coating of oil to which dust adheres very quickly. A method of cleaning locomotives which reduces the cost of the work and also eliminates the objectionable features mentioned is now being installed on railroads by the D. & M. Cleaning Process, Chicago. By this process a mixture of air, oil and water is sprayed onto the locomotive at a uniform pressure of about 90 lb. The nozzle discharges the mixture in a spray which is directed against the surface to be cleaned at an angle of about 45 deg. from a distance of about 18 in.

One gallon of oil is used to about 300 gal. of water, the proper mixture being secured by regulating valves attached to a special oil tank. The mixture of oil and water is carried to the nozzle by a $\frac{3}{4}$ in. rubber hose, the stream being



Cleaning Locomotives by the D. & M. Process

broken up at the nozzle by air supplied through a $\frac{1}{2}$ -in. nipple. The air and water pressure should be as nearly equal as possible and approximately 90 lb. per sq. in. The temperature of the water should be about 100 to 120 deg. F. as cooler water does not produce as good results. The oil used is a light straw colored gas oil or petroleum distillate having a paraffine base and ranging in gravity from 32 to 36 deg. The cleaning can be done inside the roundhouse if desired, but is more conveniently handled at some point on the track by which the engines reach the house. No difficulty is experienced in using the process in severe winter weather, and it has been operated with entire success at zero temperature.

When the D. & M. process is regularly used, locomotives can be thoroughly cleaned by two men in from 10 to 12 min. The cost, including labor, material and up-keep of equipment will not exceed 30 to 40 cents per cleaning. The first cleaning requires more time, as it is necessary to remove the accumulated dirt and oil. The advantages of the process as compared with hand wiping are: greatly decreased cost due to the saving in labor and wiping waste, a saving in time both in cleaning and repairing and a more complete cleansing of the surfaces, which makes thorough inspection possible.

The John Fritz Medal for the current year has been awarded to Major-General George W. Goethals, U. S. A., in recognition of his work as builder of the Panama Canal.

General News Department

The shops of the Pullman Company at Ludlow, Ky., were destroyed by fire on the night of May 20, together with six sleeping cars; estimated loss, \$225,000.

Prison terms of from five to eight years were imposed by the United States Court at St. Louis on May 24 as punishment for robberies of freight cars committed by eight former employees of the Wabash Railroad at Brooklyn, Ill. The trial in the court lasted five days. The men were a yardmaster, an assistant yardmaster, a chief clerk, two other clerks, a switchman, a watchman and the watchman's brother.

The Public Service Commission of New York (Second District, headquarters, Albany), announces that its inquiry into the general subject of the prevention of collisions, decided upon in connection with the investigation of the rear collision at South Byron, N. Y., last January, will be begun in New York City on Wednesday, June 18. There will be a public hearing at the office of the commission in the Hall of Records, on Chambers street, near the City Hall.

Short Line Meeting

Walker D. Hines, director general of railroads, will address the meeting called by the American Short Line Railroad Association to be held at Washington next week. He will speak at noon of the first day's session, Tuesday, June 3. In addition to the several hundred short line and trunk line railroad officers who will attend, an effort is being made to secure the presence of as many Congressmen as possible as guests.

Railroad Y. M. C. A. Membership Drive

Just as we go to press word is received that the Railroad Y. M. C. A. Continental Membership Drive which was held last week has gone well over the top. Some districts have not yet sent in their reports and it will be some days before the final figures are announced.

Safety in Track Work

On the Pittsburgh division of the Pennsylvania Railroad, by general order, track foremen, signal foremen, and carpenter foreman are directed never to obstruct the main track so as to interfere with the safe passage of trains at full speed without first having permission from the superintendent in writing. When any such work is done flagmen must be sent in both directions. Automatic block signals, if such are in use, must be set in the stop position, and after the work is done the foreman must see that the track circuit has been restored so that the automatic signals will work properly. When permission to disturb the track is sent to a foreman by telephone he must write down the message and repeat it, as would be done in the case of a train order.

Broadway Limited Restored

The Broadway Limited, the 20-hour New York-Chicago express train of the Pennsylvania Railroad, was put in service last Sunday, in accordance with the announcement made last week, after a suspension of 18 months. President Samuel Rea, in congratulating the regional director on having recognized the rights and the insistent demands of Philadelphia, Baltimore and Washington, said that in 1917 no less than 38 per cent of the passengers on this train came from those three cities. For the first trip (May 25) it was necessary to put on an additional sleeping car in both directions to accommodate the travel.

The Post Office Department announces that mail will be carried on this train; and that in the lower part of New York City, letters can be posted considerably later than heretofore,

the mail bags being sent by way of the Hudson tunnel to Manhattan Transfer, 7 miles west of New York, where the through train is stopped to have the steam locomotive attached in place of the electric engine. The Post Office Department expects to pay for this service at the rate of \$75,000 a year.

Training Disabled Soldiers for Railroad Work

The Federal Board for Vocational Education has issued a 35-page pamphlet, for the benefit of disabled soldiers, sailors and marines, telling what kinds of work they may be able to find in the field of transportation, including steam railroads, street railways, wagons, automobiles and ocean steamships and harbor craft. The government stands ready to educate and re-educate disabled men, and the educational department in the military and naval hospitals will give inquirers all needed information. This pamphlet is designed to aid individuals in choosing a vocation. It tells what kind of work must be done, and what qualifications are required, in the case of telegraphers, train despatchers, station agents and other station workers, yardmasters, clerks, ticket examiners and traffic department employees; shop work, boiler making, blacksmithing, electrical work and car repairs; track work and train work—the engineman, the fireman, the brakeman and the conductor. The work on electric railways and on ocean and harbor vessels is described in the same way. The Federal Board for Vocational Education, which is ready to give all possible aid to disabled soldiers, has offices in Boston, New York, Philadelphia, Pittsburgh, Baltimore, Washington, Atlanta, New Orleans, Dallas, St. Louis, Cincinnati, Chicago, Detroit, Kansas City, Minneapolis, Denver, San Francisco and Seattle.

A Waterway Discussion

"Inland Waterway Transportation—Is Our Policy Right or Wrong?" was the subject of a discussion before the City Club of Chicago and the Western Society of Engineers at the rooms of the City Club on Monday noon, May 19. Theodore Brent, traffic manager of the Mississippi-Warrior Waterways Barge Commission, United States Railroad Administration, took the affirmative and Professor Harold G. Moulton, of the Department of Political Economy, University of Chicago, the negative.

After outlining briefly the history of waterway development in this country and its decadence in recent years, Mr. Brent described the activities of the Railroad Administration during the past year in establishing barge service on the lower Mississippi river and elsewhere, and told of the nature of the service now offered and the amount and extent of the traffic carried. He advocated the extension of the deep waterway through the Illinois river to Chicago.

Professor Moulton opened his argument with the statement that in order to place the cost of waterway transportation on a basis comparable with that of railway service it is necessary to include the fixed charges in waterway improvements and also the maintenance costs, which is rarely done. On the basis of such a complete record of cost he had found that none of the larger inland waterways of Germany (commonly cited as the most successful) affords as cheap transportation as the railroads, with the exception of the Rhine river. He also criticized the common practice of comparing the cost of water transportation on the oceans and the great lakes with that on the railways as not being comparable with the cost of transportation on the inland waterways. He maintained that a careful analysis of complete costs would show rail transportation to be more economical than that on the inland waterways in nearly all cases and criticized the waterway advocates for their failure to present such analyses instead of general arguments.

REVENUES AND EXPENSES OF RAILWAYS

THREE MONTHS OF CALENDAR YEAR 1919

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	Total (inc. misc.).	Maintenance of way and structures.	Equip. ment.	Traffic.				
Balto., Ches. & Atlantic.....	87	\$184,880	\$81,975	\$274,257	\$33,684	\$48,842	\$2,805	\$10,647	\$9,480	\$16,935	-\$40,128
Balto., Ohio, Chgo. Terminal.....	91	1,085,036	210,664	3,511,747	100,950	139,276	3,624	27,816	90,295	387,382	-97,885
Bangor & Aroostook.....	632	1,085,036	210,664	3,511,747	100,950	139,276	3,624	27,816	63,000	56,104	-17,554
Beaumont, Sour Lake & Western.....	118	230,580	307,066	702,256	58,833	148,925	820	24,095	8,100	-829	-154,508
Belt Ry. Co. of Chicago.....	31	.....	704,697	58,833	58,833	148,925	820	24,095	46,853	-102,984	-35,855
Bessemer & Lake Erie.....	217	1,757,711	100,349	1,950,503	225,753	916,628	33,894	877,151	43,500	-161,771	117,338
Birmingham & Southern.....	37	323,430	8,218	355,147	94,345	121,313	4,915	104,533	22,029	-12,337	-312,451
Boston & Maine.....	2,258	8,585,927	4,598,806	14,835,471	1,931,737	3,355,995	117,165	9,060,381	510,449	44,035	32,133
Buff. & Susquehanna.....	296	482,905	22,021	504,926	120,302	250,151	5,479	151,113	58,666	-738,666	-40,618
Buff. Rochester & Pitt.....	589	3,090,811	356,443	3,558,106	536,257	1,219,890	43,505	1,775,239	81,000	-203,565	-183,501
Canadian Pac. Lines in Maine.....	233	1,738,330	180,784	2,019,114	253,322	338,168	7,803	663,504	48,000	-82,309	85,617
Carolina, Clinchfield & Ohio.....	232	1,238,330	180,784	2,019,114	253,322	338,168	7,803	663,504	48,000	-82,309	85,617
Central of Ga.....	1,918	2,930,327	1,500,048	4,430,375	1,022,894	1,159,206	103,944	2,446,132	171,866	4,321,019	-3,620
Central of New Jersey.....	684	7,143,645	1,022,894	8,166,539	1,159,206	2,797,775	58,611	4,301,883	47,416	92,221	-1,285,721
Central of New England.....	301	1,270,379	75,174	1,412,759	286,223	367,375	6,736	787,889	149,074	-77,415	-239,397
Central Vermont.....	411	857,160	235,724	1,195,574	138,349	346,280	17,784	844,154	1,490,174	105,477	-125,508
Charleston & Western Carolina.....	342	557,529	172,904	763,448	142,689	143,704	14,340	361,169	16,472	678,373	-50,386
Chicago & Alton.....	1,050	4,051,297	1,400,634	5,755,578	887,726	1,566,379	71,083	2,637,893	171,206	59,575	-104,937
Chicago & Eastern Ill.....	1,131	4,059,852	1,167,863	5,626,611	2,247,643	2,247,643	63,613	2,688,311	145,429	248,253	96,101
Chicago & Erie.....	269	2,049,171	215,842	2,436,163	246,871	428,962	31,851	1,360,869	84,575	172,554	-557,896
Chicago & N. W.....	8,090	19,052,112	7,535,333	28,893,988	3,673,746	6,790,425	211,083	14,975,303	1,425,000	849,406	667,688
Chicago, Burlington & Quincy.....	9,372	23,918,686	7,342,011	31,405,843	4,350,026	7,075,832	260,801	14,033,744	1,267,318	5,186,008	330,777
Chicago Great Western.....	1,496	3,156,068	1,362,431	4,844,429	593,569	1,184,344	83,736	2,324,238	435,488	312,309	-58,175
Chesapeake & Ohio.....	2,493	11,823,746	3,476,639	16,099,938	2,756,628	3,830,599	113,164	6,758,759	13,900,634	1,685,676	-271,648
Chicago, Ind. & Lou.....	657	1,751,907	599,321	2,576,402	314,606	662,350	36,384	1,102,196	95,665	269,924	231,335
Chicago Junction.....	112	22,624,842	6,573,104	31,840,986	3,200,320	10,153,236	248,231	16,112,989	1,545,342	324,768	-205,446
Chicago, Milwaukee & St. Paul.....	10,273	22,624,842	6,573,104	31,840,986	3,200,320	10,153,236	248,231	16,112,989	1,545,342	324,768	-205,446
Chicago, Peoria & St. L.....	247	567,965	72,533	660,855	114,205	184,863	7,566	338,909	57,408	-21,553	-310,762
Chicago, Rock Island & Gulf.....	474	799,633	231,250	1,080,196	199,869	223,876	19,329	518,235	33,875	99,476	-68,580
Chicago, Rock Island & Pac.....	7,723	15,676,823	2,609,625	21,099,625	4,134,039	6,171,632	279,737	11,088,200	1,247,983	200,684	-1,858,948
Chicago, St. Paul, Minn. & Omaha.....	1,749	4,125,529	1,674,458	6,269,476	570,423	1,234,446	60,286	3,152,628	174,158	311,787	248,007
Chicago, Terre Haute & S. E.....	374	884,711	65,520	970,106	164,292	243,056	11,340	372,461	43,500	-106,762	40,410
Cin., Indianapolis & Western.....	321	455,265	142,116	660,093	119,995	215,056	12,235	381,369	30,729	134,815	-238,730
Cin. New Orleans & Tex. Pacific.....	337	2,963,050	977,733	4,136,657	1,333,692	1,489,769	65,936	2,227,502	116,999	603,916	348,761
Cin. Northern.....	251	586,724	51,449	653,187	124,627	160,137	7,163	129,762	24,500	95,514	78,019
Cleveland, Cin., Chic. & St. L.....	2,395	10,708,417	3,577,362	15,445,297	3,483,566	7,377,896	253,453	12,051,910	1,828,720	2,058,207	118,081
Colorado & Southern.....	1,100	2,522,287	452,242	3,122,998	357,560	737,896	25,453	1,205,714	555,000	527,135	-203,987
Colorado & Wyoming.....	41	75,957	3,473	290,625	23,232	53,492	270	146,734	12,000	43,156	-6,555
Cripple Creek & Colo. Springs.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cumberland Valley.....	163	1,012,460	189,124	1,287,650	289,537	398,537	19,116	598,629	35,532	1,183,092	-173,097
Delaware & Hudson.....	868	6,577,539	643,089	7,635,547	1,110,958	2,420,842	54,998	3,598,708	180,000	-171,689	1,288,052
Delaware, Lackawanna & Western.....	955	12,043,329	2,680,290	16,330,156	1,467,438	3,521,178	104,509	7,390,778	902,000	2,449,600	298,076
Denver & Rio Grande.....	2,640	5,409,741	1,172,765	6,903,186	769,938	2,200,742	53,737	2,656,658	300,000	619,414	712,666
Denver & Salt Lake.....	255	393,600	59,021	471,124	149,070	284,465	2,522	339,773	27,000	-345,547	-121,747
Detroit & Mackinac.....	382	238,857	81,028	343,718	53,768	117,715	15,922	186,537	16,882	-99,404	-76,891
Detroit & Toledo Shore Line.....	61	565,078	581,113	1,146,191	38,418	44,676	1,119	162,235	36,496	291,415	115,293
Detroit, Toledo & Ironton.....	457	819,175	35,608	914,915	251,350	334,560	8,390	455,239	25,932	-198,179	111,720
Duluth & Iron Range.....	292	267,265	71,171	378,173	144,676	266,181	1,450	365,888	20,503	-461,807	-2,237
Duluth, Missabe & Northern.....	410	409,106	118,757	528,118	308,306	371,662	6,653	448,132	29,927	-616,654	200,735
Cin., Lebanon & Northern.....	76	172,074	21,206	229,977	42,411	54,422	3,899	162,321	115,531	-48,286	2,759
Wichita Falls & N. W.....	328	304,541	100,224	424,485	140,713	70,295	3,222	212,958	105,351	-27,582	9,248
Duluth, South Shore & Atl.....	599	671,098	231,515	956,954	166,510	199,272	18,363	567,125	57,000	50,412	14,928
Duluth, Winnipeg & Pac.....	178	441,296	74,987	539,674	50,847	102,534	7,116	253,740	27,346	68,086	49,915
East St. Louis Connecting.....	3	.....	259,033	33,904	112,543	182,805	9,277	339,470	9,111	-70,437	37,698
El Paso & Southwestern Co.....	1,028	2,473,100	503,983	3,128,871	380,299	598,183	28,470	867,621	1,160,350	972,685	-559,515
Elgin, Joliet & Eastern.....	822	4,744,697	18	5,637,992	450,741	1,327,992	18,659	2,103,720	159,750	1,499,590	1,421,617
Florida East Coast.....	1,989	15,080,383	2,826,457	19,729,517	2,221,139	6,825,987	175,087	10,967,970	1,897,167	1,897,167	608,940
Florida, East Coast.....	764	1,494,921	1,181,198	2,965,791	459,949	535,884	25,933	1,388,949	116,427	363,739	-768,862
Ft. Smith & Western.....	253	249,796	73,599	347,702	64,111	84,040	10,765	135,832	15,000	-18,698	-8,978
Ft. Worth & Denver City.....	454	1,701,351	619,816	2,438,510	279,286	512,231	16,133	975,018	57,532	513,822	38,571
Ft. Worth & Rio Grande.....	235	133,058	322,575	85,005	85,005	85,005	217,995	23,699	92,507	-102,520	-124,394
Fonda, Johnston & Gloversville R. R.....	88	66,286	261,377	281,545	281,545	281,545	1,491	114,351	14,700	61,663	-17,418
Galveston, Harrisburg & San Ant.....	1,382	1,449,639	1,270,966	4,661,377	770,492	1,060,921	56,438	2,051,976	136,615	671,651	-787,369
Galveston Wharf.....	13	.....	194,925	42,784	42,784	2,605	967	75,513	34,200	9,622	-48,666
Georgia.....	328	959,404	492,916	1,565,305	173,336	233,286	17,553	711,811	360,998	342,142	-36,514
Georgia, Southern Florida.....	402	349,816	1,145,876	1,915,559	191,559	261,673	89,555	1,014,722	18,850	90,175	-3,617
Grand Rapids & Ind.....	569	1,101,253	379,574	1,630,453	290,644	402,274	30,470	684,099	76,699	-144,395	-119,298
Grand Trunk Western.....	1,002	3,594,385	675,532	4,656,607	581,160	943,776	37,800	2,350,431	150,414	451,557	-1,283,471
Great Northern.....	8,254	16,572,153	3,961,917	22,496,187	3,584,772	5,091,952	156,037	10,569,051	1,251,439	1,118,936	1,469,855

REVENUES AND EXPENSES OF RAILWAYS

THREE MONTHS OF CALENDAR YEAR 1919—CONTINUED

THREE MONTHS OF CALENDAR YEAR 1919—CONTINUED														
Name of road.	Average mileage operated during period.	Operating revenues—			Operating expenses—			General.	Total.	Operating ratio.	Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	(inc. misc.)	Traffic.	Trans- portation.	Maintenance of— Way and structures.								Equip- ment.
307 Gulf & Ship Island.....	307	\$370,207	\$119,814	\$539,212	\$166,813	\$119,874	\$10,529	\$229,566	\$553,177	102.58	\$13,965	\$28,487	\$42,487	\$172,352
1930 Gulf, Colorado & Santa Fe.....	1,930	2,941,297	1,110,437	4,263,237	857,256	703,204	31,952	1,849,580	3,571,624	83.77	691,614	213,503	476,365	717,826
424 Gulf, Mobile & Northern.....	424	422,361	118,352	573,642	119,833	169,396	17,065	287,361	616,205	107.41	42,362	73,621	73,621	174,920
350 Hocking Valley.....	350	1,104,279	257,059	1,451,010	313,463	813,810	17,065	715,419	1,921,025	132.39	470,015	171,200	645,379	518,454
190 Houston, East & West Texas.....	190	405,181	121,210	549,702	98,356	73,221	2,373	245,149	431,613	78.51	118,069	18,474	99,482	34,267
856 Houston & Texas Central.....	856	1,329,958	519,793	1,950,567	402,159	397,314	22,534	900,898	1,778,905	91.19	171,662	102,072	66,558	462,156
4,782 Houston & Texas Central.....	4,782	17,341,456	5,734,731	24,757,932	4,538,652	6,845,992	207,513	10,743,631	23,091,465	93.27	1,665,509	1,235,003	425,193	2,393,797
116 Indiana Harbor & Great Northern.....	116	2,440,551	719,622	3,160,173	827,686	896,205	37,811	1,673,353	3,560,166	107.71	117,235	90,000	482,462	1,156,117
1,159 International & Michigan.....	1,159	2,440,551	719,622	3,160,173	827,686	896,205	37,811	1,673,353	3,560,166	107.71	117,235	90,000	482,462	1,156,117
176 Kanawha & Michigan.....	176	546,220	166,282	745,120	143,839	367,485	7,049	363,895	919,958	123.46	174,838	53,655	228,493	295,081
272 Kansas City, Mexico & Orient.....	272	176,138	38,882	226,418	102,969	127,413	3,707	186,334	421,705	186.25	195,287	18,781	214,088	133,936
465 Kansas City, Mexico & Orient of Tex.....	465	1,901,314	32,999	2,327,723	97,342	132,509	3,662	166,334	440,905	85.47	203,182	14,985	218,170	193,992
774 Kansas City Southern.....	774	2,693,547	552,425	3,510,732	653,932	847,526	51,442	1,479,727	4,983,635	89.79	358,098	211,529	144,809	875,450
25 Kansas City Terminal Co.....	25	1,966,037	173,424	2,232,966	357,533	722,385	3,485	1,018,580	2,993,669	94.95	13,632	60,450	44,823	36,730
902 Lake Erie & Western.....	902	1,966,037	173,424	2,232,966	357,533	722,385	3,485	1,018,580	2,993,669	94.95	13,632	60,450	44,823	36,730
96 Lehigh & Hudson River.....	96	544,969	117,754	578,219	62,769	162,968	4,799	277,675	1,682,413	90.80	53,184	15,000	38,181	5,355
1,436 Lehigh Valley.....	1,436	10,869,364	1,189,378	13,443,799	1,686,065	4,126,275	106,083	2,748,475	13,149,087	97.80	294,772	440,175	145,603	771,241
1,168 Long Island.....	1,168	1,776,998	291,307	2,474,997	793,647	837,827	23,921	2,584,475	4,593,279	100.40	18,262	271,661	293,897	397,621
1,195 Los Angeles & Salt Lake.....	1,195	2,850,259	982,326	4,036,976	664,655	852,853	47,941	1,346,287	3,093,680	76.63	943,727	195,051	747,778	256,097
302 Louisiana & Arkansas.....	302	386,455	107,849	515,861	129,166	116,218	10,282	246,407	521,047	101.05	5,185	34,050	39,263	148,030
207 Louisiana Western.....	207	539,985	338,855	910,417	170,283	127,120	11,900	275,518	605,628	87.37	3,157,375	754,276	2,400,333	1,727,901
5,013 Louisville & Nashville.....	5,013	17,473,844	6,228,152	25,005,562	4,108,139	6,211,400	309,835	10,511,445	21,846,186	80.51	13,745	12,000	121,488	17,562
199 Louisville, Henderson & St. Louis.....	199	494,095	169,910	686,184	148,677	88,544	21,988	276,890	1,063,524	108.16	328,723	226,870	555,608	15,080
1,216 Louisville, Henderson & St. Louis.....	1,216	2,774,239	1,000,947	4,026,800	591,323	1,019,543	30,757	2,596,879	6,632,585	131.51	11,345	5,109	16,544	31,151
82 Maryland, Delaware & Virginia Ry Co.....	82	166,448	71,867	244,340	24,697	42,283	1,351	181,162	235,685	104.64	3,265,753	480,000	2,784,516	1,088,834
1,861 Michigan Central.....	1,861	11,625,801	3,875,902	16,764,144	2,502,823	3,481,899	196,603	6,798,777	23,497,216	93.50	16,324	9,900	6,424	18,891
1,101 Mineral Range.....	1,101	244,012	1,492	251,296	28,593	66,271	30,775	1,617,794	3,056,444	109.03	253,244	157,572	411,707	609,139
1,646 Minneapolis & St. Louis.....	1,646	2,011,723	643,285	2,803,201	554,950	771,246	1,639	1,544,900	10,960	259.13	87.46	1,128,469	565,080	424,198
195 Minnesota & International Ry. Co.....	195	181,108	71,267	265,165	46,019	46,209	1,639	1,544,900	10,960	259.13	87.46	1,128,469	565,080	424,198
4,243 Montour R. R.....	4,243	6,827,169	1,674,254	8,999,583	1,136,950	2,180,807	67,225	4,242,538	20,047	7,871,143	87.46	1,128,469	565,080	424,198
365 Morgan's La. & Texas R. R.....	365	236,475	102,322	338,269	127,161	127,120	4,508	174,330	546,423	150.41	183,154	19,662	203,816	206,345
1,714 Missouri & North Arkansas.....	1,714	5,277,151	1,890,289	7,537,658	1,706,924	2,277,655	59,230	2,812,003	7,112,505	94.36	425,154	271,065	154,089	54,079
1,796 Missouri, Kansas & Texas.....	1,796	3,169,015	1,734,116	5,312,939	1,062,947	1,059,099	48,400	2,948,023	5,420,975	102.03	108,036	147,070	256,594	424,909
332 Missouri, Oklahoma & Gulf.....	332	229,027	52,401	297,544	137,853	129,405	4,727	195,162	1,935,551	163.74	189,667	25,507	215,591	169,475
7,108 Missouri, Pacific.....	7,108	14,490,297	4,721,406	20,202,728	4,426,953	5,153,517	214,217	9,503,764	59,012	96.98	620,965	799,179	184,860	3,746,271
995 Mobile & Ohio.....	995	2,783,920	540,641	3,521,424	593,486	1,209,760	6,581	1,720,031	3,798,356	107.86	97,932	157,499	434,886	437,164
108 Monongahela.....	108	726,171	183,353	894,477	185,350	106,364	2,663	727,282	1,961,010	73.00	217,207	15,000	202,188	113,040
6 Montongahela Connecting.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
54 Montour R. R.....	54	189,381	51,191	210,286	40,368	202,832	1,540	313,027	628,895	143.86	92,246	6,886	99,133	35,918
400 Morgan's La. & Texas R. R.....	400	1,165,719	521,527	1,782,145	254,506	409,096	23,398	812,329	1,564,235	87.77	217,909	92,225	124,914	543,747
1,247 Morgan's La. & Texas R. R.....	1,247	2,786,423	1,296,229	4,416,852	983,255	1,255,466	9,076	2,173,829	4,680,631	105.97	263,778	150,000	104,445	174,359
168 Nevada Northern.....	168	271,459	35,003	424,706	49,550	68,047	2,759	127,103	261,292	61.52	163,415	54,967	108,445	174,359
112 Newburgh & South Shore R. R.....	112	276,924	38,764	325,188	76,994	16,516	3,777	225,335	328,063	100.88	2,876	10,200	13,076	84,611
7 Newburgh & South Shore R. R.....	7	789,484	91,226	1,024,211	283,366	140,624	8,760	712,683	1,276,019	124.58	251,808	34,500	286,308	41,098
172 Grand Trunk Lines in N. E.....	172	789,484	91,226	1,024,211	283,366	140,624	8,760	712,683	1,276,019	124.58	251,808	34,500	286,308	41,098
164 Grand Trunk Lines in N. E.....	164	152,548	21,501	234,320	55,767	91,182	4,096	97,352	16,284	113.01	30,505	9,975	40,488	106,292
398 Mississippi Central.....	398	984,936	329,445	1,478,432	187,241	403,579	22,168	786,038	1,460,549	98.79	17,883	85,071	67,248	388,860
284 New Orleans & N. E.....	284	383,261	116,651	527,157	114,577	114,577	6,895	227,262	486,940	92.37	40,217	32,230	7,688	102,212
6 New Orleans Great Northern.....	6	.....	.....	249,569	31,861	65,424	.....	139,571	233,887	93.71	15,682	300	15,382	9,568
191 New Orleans Transfer Co.....	191	279,375	89,092	407,183	95,388	112,936	6,514	147,393	385,417	94.65	21,766	30,000	8,268	214,963
6,075 New Orleans, Texas & Mexico.....	6,075	43,491,611	17,901,874	68,765,905	15,244,583	583,411	32,111,714	1,834,265	60,126,279	87.43	8,639,626	3,043,990	5,592,307	2,106,734
372 New York Central.....	372	5,310,321	437,905	6,114,763	925,790	1,455,779	76,501	2,428,819	161,517	74.87	1,536,350	165,000	1,370,987	1,361,437
1,965 New York, Chicago & St. L.....	1,965	9,866,708	9,642,771	21,943,870	2,153,052	5,327,305	116,345	12,280,978	828,425	99.98	3,024	804,000	806,900	2,262,729</

The \$400,000,000 Car Trust Certificates

A joint meeting of members of the Association of Railway Executives, bankers, the War Finance Corporation and the Railroad Administration was held on May 27 to discuss the further plans for issuing a joint series of car trust certificates, covering the 100,000 freight cars and 1,930 locomotives ordered by the government. The bankers present at the meeting included Pierrepont V. Davis, vice-president of the National City Company; Arthur M. Anderson, of J. P. Morgan & Co.; Jerome Hanauer, of Kuhn, Loeb & Co.; Francis M. Weld, of White, Weld & Co.; E. B. Sweezy, vice-president of the First National Bank; George W. Davison, vice-president of the Central Union Trust Company; E. V. R. Thayer, president of the Chase National Bank; James Speyer, of Speyer & Co.; Harold Stanley, vice-president of the Guaranty Trust Company; A. A. Tilney, vice-president of the Bankers' Trust Company; Charles S. Speare, of Brown Bros. & Co.; and G. Frederick Hawkins, of Kissel, Kinnicutt & Co.

Eugene Meyer, Jr., managing director, and Alfred A. Cook, counsel, were present in behalf of the War Finance Corporation. Swager Shirley, F. Q. Brown and Sanford H. E. Freund represented the railroad administration.

Members of the Association of Railway Executives who attended included T. De Witt Cuyler, chairman; Alfred P. Thom, counsel; Howard Elliott, W. W. Finley, Charles Hayden, W. G. Besler, C. A. Peabody, Mark W. Potter, Daniel Willard, E. G. Buckland, E. M. Hyzer and Marvin Hughitt.

Aviation

The United States Navy seaplane, NC-4, completed a trip across the Atlantic Ocean on Tuesday, May 27. Lieutenant-Commander A. C. Reid, with a crew of five men, landed at Lisbon, Portugal, the evening of that day in 9 hours 43 minutes, from Ponta Delgada, Azores, 800 miles. The NC-4 left Trepassey, Newfoundland, on May 16, and reached the Azores in about 17 hours, but had to wait there until the 27th for favorable weather before continuing the journey. The total flying time from Newfoundland to Lisbon, about 2,000 miles, is given as 26 hours 41 minutes.

The United States Post Office Department announces that in the first week of the airplane mail service between Cleveland, Ohio, and Chicago, Ill., 28 of the 30 possible trips were successful. The distance, about 350 miles, was made on one trip in less than three hours. One of the pilots, Frank McCusker, was killed by an accident to his airplane at Cleveland on May 25.

On May 27, four airplanes of the War Department completed a cross country flight of 3,300 miles from Texas to the Pacific Coast and return. These fliers, for considerable distances, made speeds of 140 miles an hour and higher. Two of the airplanes flew over the Grand Canyon. One of these flew at an altitude of 13,000 ft., while the other flew down into the Canyon, about 600 ft. below the edge.



Photo from International Film Service

Repairing the Railway Cut by the Rioters Near Cairo, Egypt

Traffic News

Charles E. Wallington, an attorney, has been elected president of the Toledo Transportation Club.

The number of vessels passing through the Cape Cod canal, from August, 1918, to April, 1919, averaged 468 a month, as compared with an average during the corresponding months one year ago of 235 vessels. The increase in tonnage of cargoes was 185 per cent.

Freight loading of railroads in the Northwestern region for week ending May 20, compared with the corresponding period last year shows a decrease of approximately 9.5 per cent, 149,125 cars being loaded in the week ending May 20, 1919, as compared with 164,635 for the same period last year.

The recent order of the director general authorizing a rate of one and one-third fare for the round-trip for conventions of religious, fraternal, educational, charitable and military organizations involves so much detail that it is found impossible to make it effective for meetings convening earlier than June 10. It is necessary to print and distribute several million certificates to 50,000 or more ticket offices, and to correspond with various organizations for the purpose of establishing regulations as well as to prepare tariffs and file them with the Interstate Commerce Commission.

Montana, its advantages and possibilities, is the subject of the latest illustrated booklet issued by the Agricultural Section of the Railroad Administration for distribution among homeseekers and others. S. V. Stewart, governor of the State, contributes a foreword to the booklet: Montana is no longer to be considered a mining and grazing state with little agricultural land. In the past ten years 30,000,000 acres of public lands within the state have been filed upon for homesteads, and there are 83,000 farms in the state. Unirrigated farms with wheat production records of from twelve to forty bushels an acre and which are within a reasonable distance of a railroad and a town with school facilities may be bought for \$15 to \$40 an acre, while irrigated land sells for \$40 to \$150 an acre.

Minnesota Drinking-Cup Law

The Minnesota legislature has passed a law requiring individual drinking cups on all cars used for transportation of passengers. There must be pure drinking water and a sufficient number of cups, or a fountain. The law becomes effective on June 1, 1919. A fine of not less than \$25 nor more than \$100 is prescribed as the penalty for failure to comply with the law. Cups and fixtures must be kept in a sanitary condition.

Dry Canada

[From the Buffalo Courier]

That it is still dangerous to smuggle booze through Canada was shown at St. Thomas on May 20, in the trial of employees of the Pullman company, accused of smuggling whisky from Buffalo into Canada in a parlor car. The men, mostly of a dusky hue, trembled visibly when they appeared in court, the judge having ruled that it was just as much an offense to smuggle whisky through dry Canada as it is to import it into dry Canada. The contention was set forth that the liquor was being carried in a parlor car of Buffalo to Detroit train No. 45, and not for delivery within the Dominion; but the three men were fined \$200 apiece and costs. The whisky was discovered when the authorities at St. Thomas got a tip that a shipment was on its way to Detroit. That city is as dry as Sahara, and it is a very high-paying business at the present time, a quart of good whisky bringing as high as ten dollars.

Commission and Court News

Interstate Commerce Commission

The Commission has announced its intention of investigating the rates, charges, rules, regulations and practices applicable to freight transportation in Illinois as compared with those applicable in Ohio and Michigan, and also those in Central Freight Association territory.

Rates on Coal from Western Kentucky

Ohio Valley Coal Operators Association v. Illinois Central Railroad Company, Director General, et al.

Upon complaint attacking the rates on bituminous coal, in carloads, from mines in western Kentucky on the Illinois Central, Louisville & Nashville, and Kentucky Midland railroads, to points in Mississippi Valley and southwestern territories, Illinois, and various other northern and western states, the Interstate Commerce Commission finds:

The rates assailed are not shown to be unreasonable *per se*, nor are they shown to be unduly prejudicial except to the extent stated in the following:

The rates from mines on the Illinois Central to points in Texas by way of Mississippi River crossings south of East St. Louis are unduly prejudicial to the extent that they exceed the rates from mines on the Illinois Central in southern Illinois to the same points through the same crossings.

The rates from mines on the Illinois Central and the Louisville & Nashville to East St. Louis and St. Louis, proper, are unduly prejudicial to the extent that they exceed by more than 57.5 cents per ton the rates from mines in the Illinois Central's inner group and the Louisville & Nashville's Belleville group, respectively, in southern Illinois to the same destinations.

The rates from mines on the Illinois Central and Louisville & Nashville to East St. Louis, as applied on traffic for beyond, are unduly prejudicial to the extent that they are not lower than the rates from the same mines to East St. Louis, proper, by at least 12.5 cents per ton.

The rates from mines on the Illinois Central to Chicago, to points in the northwest as defined in this report, and to points in Illinois north of and including Mattoon and Decatur, are unduly prejudicial to the extent that they exceed the rates from mines on the Illinois Central in the southern Illinois group by more than 25 cents per ton.

The rates from mines on the Louisville & Nashville to Chicago are unduly prejudicial to the extent that they exceed the rates from mines on that road in the Eldorado group in southern Illinois to Chicago by more than 25 cents per ton.

The rates from mines on the Kentucky Midland Railroad are unduly prejudicial to the extent that they exceed the rates from mines on the Illinois Central in western Kentucky to the same destinations. (Decided May 1.)

Personnel of Commissions

John H. Delaney has been appointed rapid transit construction commissioner for New York City. This office takes over the functions of the former Public Service Commission in connection with the construction of new subway and elevated railroads in New York City. The single commissioner, to perform the other functions of the Public Service Commission, Lewis Nixon, was appointed several weeks ago.

Court News

Causes of Action While Under Federal Control

The federal district court for the Northern District of Nebraska holds that General Order No. 50, providing for the substitution of the Director General of Railroads in case of

actions against railroads for causes arising since government control was assumed, is warranted, notwithstanding Section 10 of the Act of March 21, 1918, C. 25, providing that actions or suits may be brought against such carriers, for the Director General is the carrier, being analogous to a receiver, and it is proper that he be substituted in place of the railroad company.—*Rutherford v. Union Pacific*, 254 Fed. 880. Decided January 11, 1919.

Substitution of Director General as Defendant

The federal district court for the Southern District of New York holds that the provision of General Order No. 50 of October 28, 1918, that pleadings in pending actions against a railroad company for injuries "may" be amended by substituting the Director General, and dismissing the company as defendant, must be construed as permissive only, in view of the Federal Control Act provision that carriers, while under federal control, shall be subject to all laws and liabilities as common carriers, and that actions may be brought against them, "and judgments rendered as now provided by law," and such substitution of parties will not be made on motion of the defendant.—*Jensen v. Lehigh Valley*, 255 Fed. 795. Decided February 1, 1919.

United States Supreme Court

Effect of Misdescription of Lost Goods in Bill of Lading

In an action to recover the value of furs lost in transit in interstate commerce, the railroad resisted the claim on the ground that the goods were misdescribed in the bill of lading as "one case D. G." (dry goods). This was done by a mistake of the local expressman, and not with the intention of fraudulently misrepresenting the nature of the shipment. The filed freight rates were first class (65 cents) for dry goods and double first class for furs. The Supreme Court of the United States refused to sustain the railroad's contention, for the reason that a clause in the bill of lading provided for the contingency of misdescription as follows: "If upon inspection it is ascertained that the articles shipped are not those described in this bill of lading, the freight charges must be paid upon the articles actually shipped." The court holds that the effect of this provision is that a misdescription of the character of the goods, not attributable to fraud, does not affect the liability of the carrier for a failure to deliver the goods.—*N. Y. Central v. Goldberg*. Decided May 19, 1919.

Federal Employers' Liability Act Decisions

The Supreme Court of the United States, reversing a judgment of the Supreme Court of Idaho, holds that an employee of a railroad which was engaged in interstate commerce, injured while filling with earth a wooden trestle bridge, 1200 ft. in length, was himself engaged in interstate commerce. The court considers the state Supreme Court fell into error in regarding the fill as new construction so unrelated to the conduct of interstate commerce over the bridge at the time the accident occurred that the work being done might be regarded as not related to or necessary to the safe conduct of that commerce.—*Kenzell v. Chicago, M. & St. P.* Decided May 19, 1919.

The Supreme Court of the United States holds that an employee of an interstate railroad, injured while engaged in taking care of a camp car used by a gang of bridge carpenters who were employed by the railroad in the repair of the bridges and bridge abutments upon the line, and who cooked the meals for himself and the other members of the gang, was engaged in interstate commerce within the Federal Employers' Liability Act. The significant thing, in the court's opinion, was that the employee was employed by the railroad to assist, and was assisting, the work of the bridge carpenters by keeping their bed and board close to their place of work, thus rendering it easier for the railroad to maintain a proper organization of the bridge gang and forwarding their work by reducing the time lost in going to and from their meals and their lodging place.—*P. B. & W. v. Smith*. Decided May 19, 1919.

Equipment and Supplies

Locomotive Deliveries Week Ended May 17

The following locomotives were shipped to railroads under federal control during the week ended May 17:

Works	Road	Number	Type
American	Penn. L. W.	1	USRA Santa Fe
	L. & N.	5	USRA Pacific
	N. & W.	2	USRA Mount.
	Penn. L. W.	2	USRA 6W. Sw.
		10	
Baldwin	Ft. Worth & D. C.	1	USRA Mikado
	Sout. Pac.	3	Santa Fe
	Southern	1	USRA Mount.
	B. & O.	2	USRA 8W. Sw.
	I. H. B.	4	USRA 8W. Sw.
	Tex. & Pac.	1	Santa Fe
	A. T. & S. F.	1	Mikado
	C. B. & Q.	1	Santa Fe
	A. T. & S. F.	1	Pacific
		15	
Total		25	

Locomotives

THE NORTHERN RAILROAD OF FRANCE has ordered 50 Mikado locomotives from the Baldwin Locomotive Works.

THE NORWEGIAN STATE RAILWAYS, noted in last week's issue as reported to have ordered 16 locomotives from the Baldwin Locomotive Works, placed orders for 18 locomotives with that company, including 2 ten-wheel, 6 Consolidation, 7 Prairie and 3 six-wheel switching locomotives.

Freight Cars

THE SOUTH PORTO RICO SUGAR COMPANY has ordered 65, 30-ton, all-steel cane cars from the American Car & Foundry Company.

THE H. & H. REFINING COMPANY, Kansas City, Mo., has ordered 20, 40-ton, 8,000-gal. tank cars from the American Car & Foundry Company.

THE ROBERT DOLLAR STEAMSHIP COMPANY, San Francisco, Cal., has ordered from the American Car & Foundry Company 100 high-side gondola cars for export to China.

Signaling

THE PARIS, LYONS & MEDITERRANEAN has under consideration the question of installing automatic block signals on 500 miles of its lines.

THE CENTRAL RAILROAD OF NEW JERSEY has ordered a 36-lever improved Saxby & Farmer interlocking machine from the Union Switch & Signal Company, for installation at Elizabethport, N. J.

THE NORFOLK & PORTSMOUTH BELT LINE has placed an order with the Union Switch & Signal Company, Swissvale, Pa., for the necessary material to be used in an interlocking to protect traffic over the Elizabeth river drawbridge at Norfolk, Va.

A special meeting of the National Industrial Traffic League will be held in Milwaukee, Wis., on June 11, 12 and 13, to finish business left over from the New Orleans meeting and to take action on the resolutions submitted at that meeting looking toward the forming of a program for the regulation of railroads.

Supply Trade News

Colonel Frederic A. Molitor has returned from military service abroad and has resumed his practice of engineering at 34 Nassau street, New York.

L. M. Sawyer, vice-president of the Chicago Steel Tape Company, Chicago, has been elected president, succeeding Lewis A. Nichols, deceased.

W. L. Garland, manager of the Philadelphia (Pa.) office of the Safety Car Heating & Lighting Company, has been elected a vice-president, with headquarters at Philadelphia, Pa.

Fred H. Jones, resident manager of the General Railway Signal Company at New York City, has resigned that position, effective June 1. He is to engage in the manufacture and sale of railway appliances in Chicago.

The Pollak Steel Company, Cincinnati, announces the appointment of the B. W. Parsons Company, 1001 Pioneer building, St. Paul, Minn., northwestern sales representative, in St. Paul, Minneapolis, Duluth and the Iron Range district.

The Massey Concrete Products Corporation, Chicago, has appointed P. E. Longstreet resident manager of the Western district. Mr. Longstreet is in charge of all sales in that territory with headquarters at 925 South Sixth street, West, Salt Lake City, Utah.

The North American Car Company, Chicago, has purchased a 23-acre tract at 135th street on a joint right of way of the Indiana Harbor Belt, the Baltimore & Ohio Chicago Terminal and the Chicago, Rock Island & Pacific, upon which a car construction and car repair plant will be built in the near future.

W. J. Crombie on May 1 became associated with the Gustin Bacon Manufacturing Company, 1021 Filbert street, Philadelphia, Pa. Mr. Crombie formerly served with the Baltimore & Ohio, the Delaware, Lackawanna & Western and of late years with the Belmont Packing & Rubber Company, Philadelphia.

George Shields, who was purchasing agent of the American Car Company, St. Louis, for ten years, and later served with the National Safety Car & Equipment Company since its organization, has become associated with The Dayton Manufacturing Company as sales representative, with headquarters at Dayton, Ohio.

The Bay City Foundry & Machine Company, Bay City, Mich., manufacturer of coal conveyors, saw mill machinery and hoists, has purchased the business of the Howlett Construction Company, Moline, Ill., manufacturer and builder of the Williams, White & Co., coaling stations. W. E. Howlett, manager and engineer of the Howlett Construction Company, will be manager of the railroad coaling station department of the consolidated company. This consolidation will unite the engineering facilities of the two companies and enable them to manufacture their own machinery.

Westinghouse Electric & Manufacturing Company

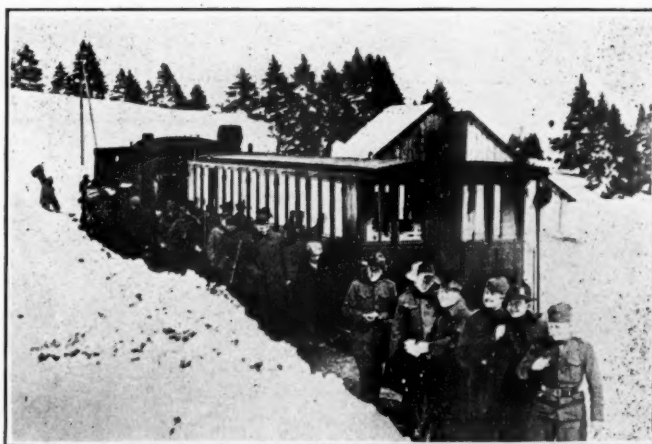
The report of the Westinghouse Electric & Manufacturing Company for the year ended March 31, 1919, shows gross business amounting to \$160,379,942, an increase of nearly \$65,000,000 over the preceding year. This is the greatest volume ever reported in the history of the company, and compares with a gross business of \$43,733,646 in the year preceding the war, 1914. After the deduction of operating expenses of \$129,271,556, the net manufacturing profit for the year was \$31,408,386, or more than double the net manufacturing profit, in the year ended in March, 1918, and approximately seven times the net manufacturing profit of 1914.

Other income brought the gross income to \$32,731,648. After all charges and the deduction of Federal taxes, amounting to \$15,395,846, there was a surplus available for dividends of \$15,059,097, or the equivalent of \$10.63 a share on the outstanding common shares of \$50 par value after providing for preferred dividends. In the preceding year the earnings applicable to the common were equal to \$10.68 a share.

The gross earnings, the report says, include the earnings of the J. Stevens Arms Company and the New England Westinghouse Company. The latter plant will hereafter be devoted to the manufacture of industrial motors and automobile starting and lighting apparatus, thus relieving a crowded condition at Newark and certain departments at East Pittsburgh. Negotiations are in progress for the sale of the company's holdings of 5 per cent prior lien debenture bonds of Electric Holdings of London, which were received in payment for the holdings of the British Westinghouse Electric & Manufacturing Company. Inventories were approximately \$1,000,000 less than in the report of the preceding year. The report shows orders on hand as of April 1, amounting to \$76,248,000, excluding the orders cancelled as a result of the armistice.

The general balance sheet follows:

ASSETS	
Property and plant.....	\$41,806,414
Investments	21,592,258
Current assets:	
Cash	14,127,249
Cash with agents and others.....	675,342
Cash on deposit for redemption of debentures, bonds, notes and for interest and dividends.....	154,264
Notes receivable	2,980,343
Accounts receivable	38,500,133
Working and trading assets:	
Raw materials and supplies, finished parts and machines, work in progress, goods on consignment and apparatus with customers, inventoried at cost or less.....	59,550,261
Other assets:	
Patents, charters and franchises.....	5,137,421
Insurance, taxes, etc., paid in advance.....	361,573
Deferred charges to operations.....	8,225
Total	\$184,893,483
LIABILITIES	
Capital stock:	
Preferred	\$3,998,700
Common	70,813,950
Funded debt	6,305,000
Fifteen year five per cent notes.....	10,000
One year notes, due February 1, 1920.....	15,000,000
Real estate purchase money mortgages.....	120,000
Current liabilities:	
Notes payable—current bank loans.....	5,280,000
Subscriptions to Liberty Loan bonds.....	8,186,782
Accounts payable	10,905,700
Interest, taxes, royalties, etc., accrued, not due.....	15,843,338
Dividend on preferred stock, payable in April.....	69,977
Dividend on common stock, payable in April.....	1,239,244
Advance payments on contracts.....	4,613,675
Unpaid debenture certificates, bonds, notes and interest and dividends	154,264
Reserve:	
Against inventories, notes and accounts receivable, etc.....	6,145,120
Profit and loss—Surplus.....	36,207,733
Total	\$184,893,483



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Party of American Soldiers Starting Out for a Day's Outing on Mount Renard in the French Alps

Financial and Construction

Railway Financial News

BOSTON & MAINE.—Judge Julius M. Mayer, in the Federal District Court, signed a decree, upon the consent of Frank M. Swacker, Assistant United States District Attorney, granting permission to James L. Doherty and other federal trustees, to postpone from October 1, 1919, to October 1, 1920, the sale of the stock of the Boston & Maine standing in the name of the Boston Railroad Holding Company, and the securities of the various leased companies, which was ordered disposed of by the decree of dissolution obtained by the government on October 17, 1914, in its Sherman anti-trust suit against the New York, New Haven & Hartford.

CINCINNATI, HAMILTON & DAYTON.—By a Cincinnati court order all of the unmortgaged securities held by this company in outside corporations are to be auctioned to help satisfy creditors' claims amounting to about \$55,000,000.

GEORGIA COAST & PIEDMONT.—This road, which was to have been sold at Brunswick, Georgia, on May 6, but had no bidders on the ground, will be again offered for sale on Tuesday, July 1.

GRAND TRUNK.—See editorial elsewhere in this issue.

LOUISIANA & NORTHWEST.—This property will be offered for sale at public auction on June 19 at the court house in Homer, La., by W. P. Leary, special master in chancery. The road operates 121 miles of line between Magnolia, Ark., and Natchitoches, Louisiana.

NEW YORK, NEW HAVEN & HARTFORD.—Judge Manton in the Federal District Court of New York has denied the application of Harold Norris and other minority stockholders for the appointment of a limited receiver to prosecute liability and restitution suits against the former directors of this road. Because of the filing of this opinion the proceedings for the appointment of a permanent receiver were put over to the June term.

Railway Construction

TEXAS & PACIFIC.—Plans have been prepared by this road for the construction of a divisional terminal at Eastman, Texas, at an approximate cost of \$500,000, but as yet no authority has been issued for their construction.

LIVE OAK, PERRY & GULF.—Contracts have been given recently to J. D. Donnahoo, Jacksonville, Fla., to build four miles of the Economa river extension west, and to build a bridge across the Aucilla river. The company now has work completed on about five miles of the total extension, which is to be about ten miles long.

Trade Publications

PNEUMATIC TOOLS.—In a temporary catalogue, containing 48 pages, issued pending the publication of a larger book, the Keller Pneumatic Tool Company, Grand Haven, Mich., shows briefly its line of pneumatic tools, including valve and valveless types of rotary and piston drills, which are new additions to the line. All models of Keller-made master-built chipping hammers, riveting hammers, holders-on, dolly bars, jam riveters and sand rammers are illustrated and described, with detailed specifications and information as to the uses for which each is designed. This company has also published a four-page folder containing a list of its special tool making and production equipment, with a few illustrations of representative operations and productions.

Railway Officers

Railroad Administration

Federal and General Managers

Colonel N. L. Howard, whose appointment as assistant to the federal manager of the Chicago, Burlington & Quincy, with headquarters at Chicago, was announced in the *Railway Age* of May 16 (page 1236), was born at Fairfield, Iowa, and received his education in the United States Military Academy at West Point, N. Y., from which institution he graduated in 1907. Shortly after his graduation from West Point he entered the service of the Chicago, Burlington & Quincy as a civil engineer. Later he was transferred to the operating department as trainmaster at Centerville, Iowa. He next acted in the capacity of assistant superintendent at Galesburg, Ill., and then as superintendent of the Burlington division, at Burlington, Iowa, until 1916, when he was transferred to the Hannibal division at Hannibal, Mo. In June, 1917, he was recommended for a commission as lieutenant-colonel in the Chicago railway regiment, the 3rd Reserve Engineers, and in July of the same year entered military service as lieutenant-colonel in the 3rd Reserve Engineers stationed at Chicago. In May, 1917, he joined the 13th Engineers, and in July of the same year was sent abroad, landing in France in August. Upon his arrival in France he was detached from the 13th Engineers and placed on duty with the director general of transportation until the spring of 1918, when he was returned to the command of the 13th Engineers, then stationed in the Verdun sector. On July 8, 1918, Lieutenant Colonel Howard was promoted to colonel. While in command of the 13th Engineers he saw service in the Champagne, St. Mihiel and Meuse-Argonne offensive, and on February 22, 1919, he was awarded the Croix-de-Guerre by the French High Command. On February 28, 1919, he was relieved of his command and returned to this country in March, when he entered the services of the Chicago, Burlington & Quincy as assistant to the federal manager.



Col. N. L. Howard

Operating

E. K. Merkle, trainmaster on the Colorado lines of the Denver & Rio Grande with headquarters at Pueblo, Colo., has been transferred to the Salt Lake division with headquarters at Thistle, Utah, succeeding **J. W. Barrett**, who has been transferred to Helper, Utah, in place of **M. J. Ruland**, who has been moved to Provo, Utah, to take the place of **E. S. Wright**, who has been transferred to the Colorado lines of the Denver & Rio Grande.

Engineering and Rolling Stock

George H. Webb, colonel of the 16th Engineers (Railway regiment), has resumed his former duties as chief engineer of the Michigan Central, the Chicago, Kalamazoo & Saginaw and the Detroit Terminal, with headquarters at Detroit, Mich.; **J. F. Deimling**, acting chief engineer of these roads has resumed his former duties as assistant chief engineer, with headquarters at Detroit, to succeed **George H. Harris**,

who has been performing the duties of assistant chief engineer and will now assume the duties of special engineer on these roads.

Purchasing

H. P. McQuilkin, whose appointment as general storekeeper of the Baltimore & Ohio, the Cumberland Valley, the Western Maryland and the Cumberland & Pennsylvania, with headquarters at Baltimore, Md., has already been announced in these columns, was born on February 6, 1887, at Martinsburg, W. Va., and was educated in the public and high schools of his native town. He began railway work on April 1, 1905, as distributor in the stores department of the Baltimore & Ohio at Cumberland, Md., and the following year served as clerk in the motive power department. He was out of railway work from October, 1906, to September, 1910, and then became storekeeper on the Baltimore & Ohio, at Connellsville, Pa. He was later storekeeper at Washington, Ind., and from April, 1914, to December, 1916, was district storekeeper for the Baltimore & Ohio and the Cincinnati, Hamilton & Dayton at Cincinnati. He was then, to April, 1918, chief clerk to the general storekeeper on the Baltimore & Ohio at Baltimore, and subsequently served consecutively as chief clerk to the purchasing agent until June, 1918, and assistant general storekeeper, until his promotion to general storekeeper on the same road.

Corporate

Executive, Financial, Legal and Accounting

James L. Minnis, vice-president and general solicitor of the Wabash, with headquarters at St. Louis, Mo., has resigned to engage in the practice of law in St. Louis.

H. A. Dixon, district engineer of the Pacific district of the Canadian National, with headquarters at Vancouver, B. C., has been appointed chief engineer, Western lines, with headquarters at Winnipeg, Man., to succeed **A. T. Fraser**, deceased.

Operating

G. E. MacDonald, of the MacDonald-Marpole Company, Ltd., Vancouver, B. C., has been appointed general manager of the Pacific Great Eastern, with headquarters at Vancouver, B. C., to succeed **G. L. Courtney**, who has resigned.

Traffic

S. J. Witt has been appointed general freight agent of the Akron, Canton & Youngstown Railway Company, with offices at Akron, Ohio.

Engineering and Rolling Stock

W. F. Connal has been appointed mechanical engineer of the Canadian National, with headquarters at Toronto, Ont., to succeed **H. D. Cameron**, who recently resigned to enter the employment of the Robinson Connector Company, Montreal, Que.

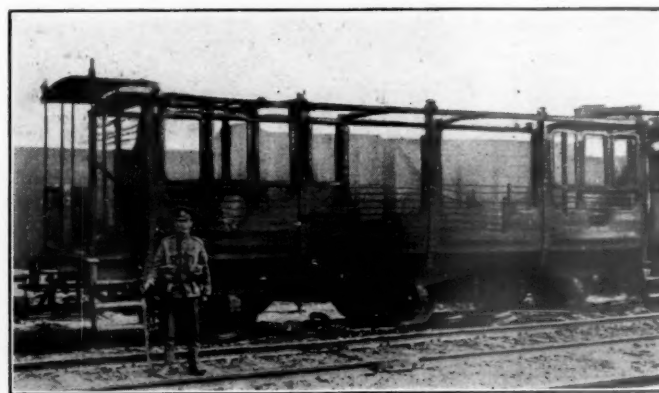


Photo from International Film Service

One of the Cars Destroyed in the Riots in Egypt